

MAR 25 1929

AUTOMOTIVE INDUSTRIES

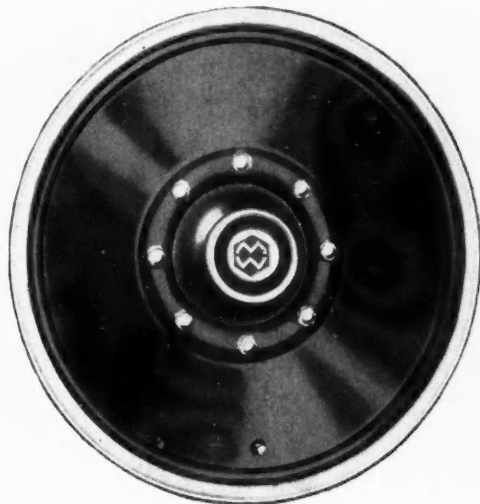
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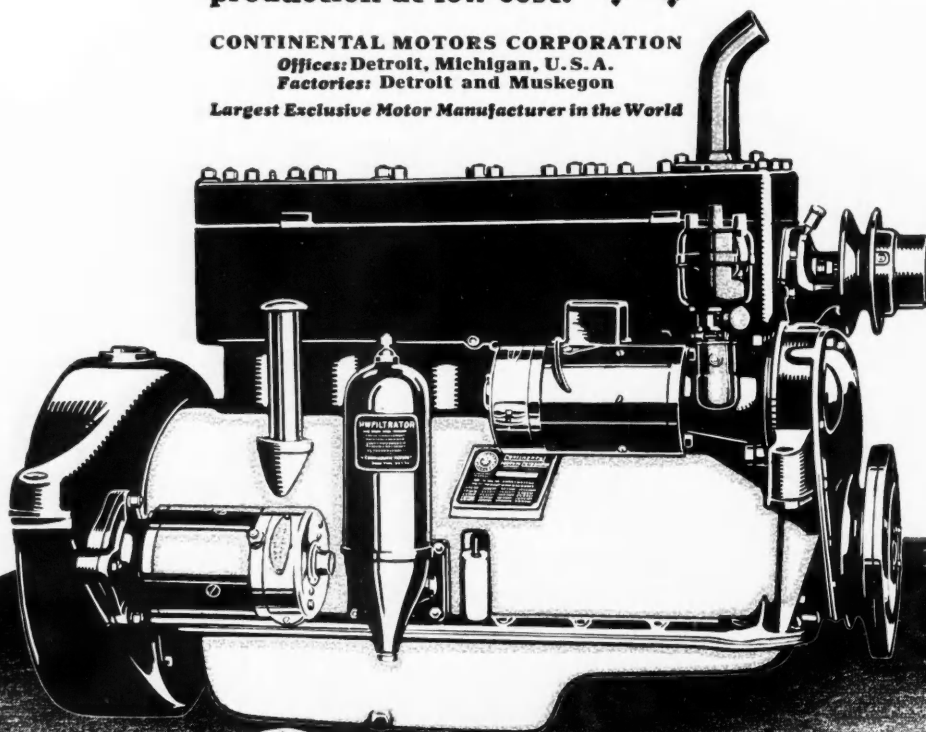
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Vol. 60

No. 12

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JULIAN CHASE, Business Manager
Automotive Industries
Cable Address
Telephone

GEO. D. ROBERTS
Advertising Manager
Autoland, Philadelphia
Sherwood 1424

OFFICES

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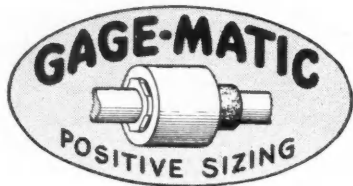
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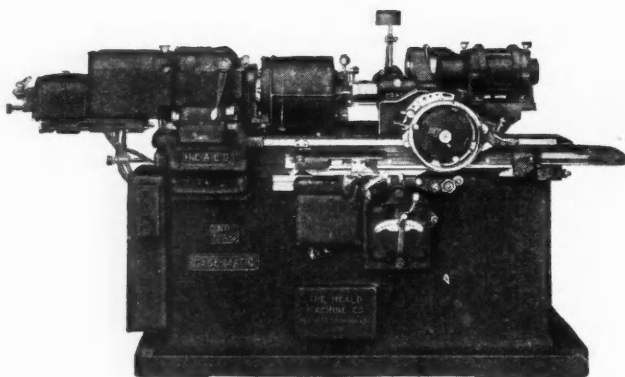
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HEALD

AUTOMOTIVE INDUSTRIES

VOLUME 60

Philadelphia, Saturday, March 23, 1929

NUMBER 12

Automotive Bills Introduced At Mass Production Rate

Approximately 2,500 measures proposing regulations for motor vehicles and their owners and drivers have been presented to General Assemblies of forty-one states.

By
EARL
O.
EWAN

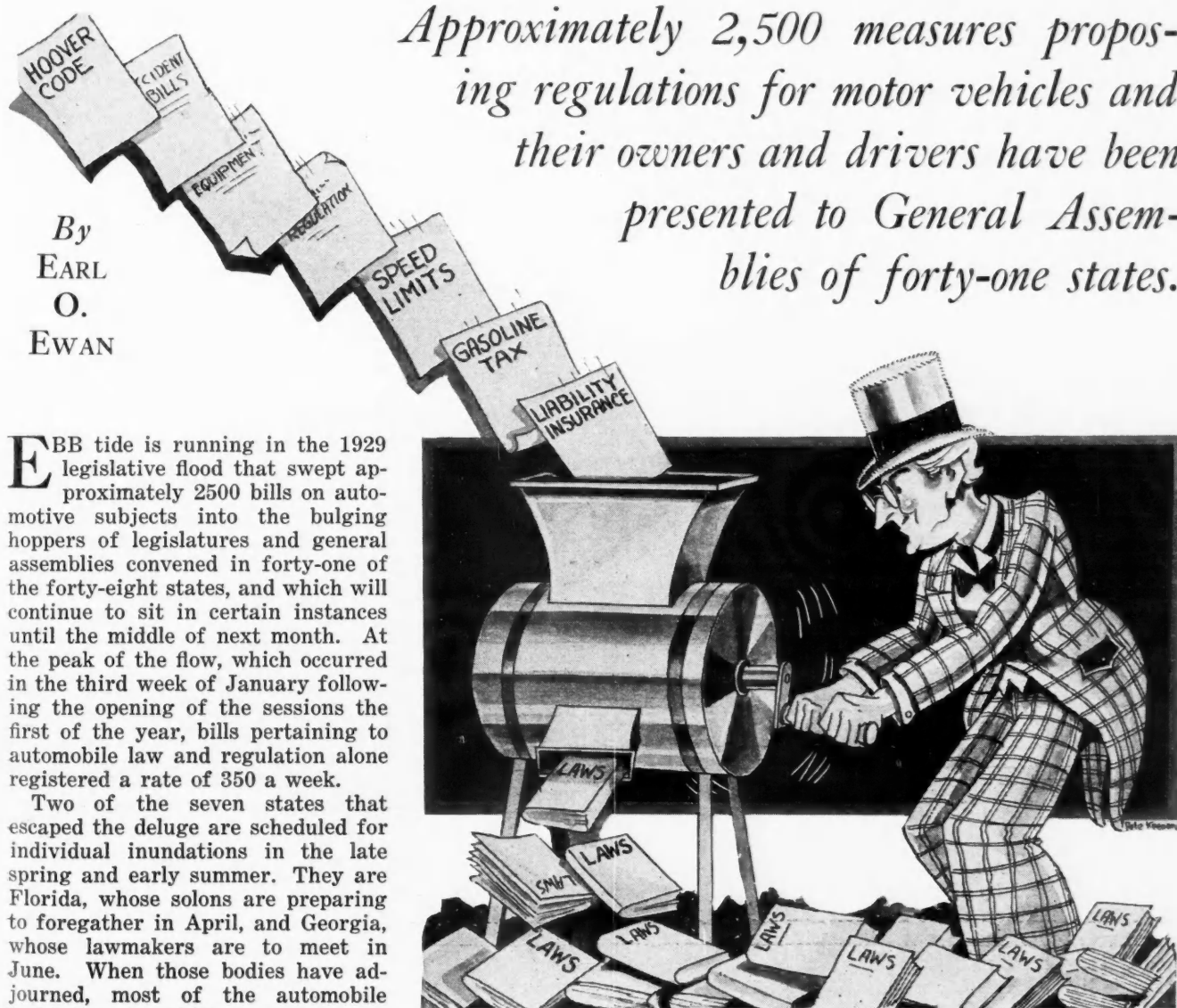
EBB tide is running in the 1929 legislative flood that swept approximately 2500 bills on automotive subjects into the bulging hoppers of legislatures and general assemblies convened in forty-one of the forty-eight states, and which will continue to sit in certain instances until the middle of next month. At the peak of the flow, which occurred in the third week of January following the opening of the sessions the first of the year, bills pertaining to automobile law and regulation alone registered a rate of 350 a week.

Two of the seven states that escaped the deluge are scheduled for individual inundations in the late spring and early summer. They are Florida, whose solons are preparing to foregather in April, and Georgia, whose lawmakers are to meet in June. When those bodies have adjourned, most of the automobile legislation to which manufacturers and their patrons will have to conform in so far as possible until early in 1931 at least will have been enacted. That situation exists because comparatively few legislatures meet in the even years, only nine having been in session in 1928. The legislatures will not be convened this year in Alabama, Kentucky, Louisiana, Mississippi and Virginia.

Contrary to what seems to be the general impression, the bulk of bills in the automotive field this year has not exceeded the average of recent biennial legislative ses-

sions, we were informed by the Motor Vehicle Conference Committee. Its member organizations are, as is known, the American Automobile Association, the National Automobile Chamber of Commerce, the Motor and Equipment Association, the National Automobile Dealers Association and the Rubber Association of America. Most of the data on which this article is based was obtained from the Committee.

The greater part of the volume of proposed measures



is intended as minor amendments to existing statutes. The purpose of the bills in many instances is to eliminate loopholes in the present laws. A number of the bills are proposed amendments to gasoline tax statutes. Four such bills have been introduced in Colorado, 10 in Indiana, nine in Tennessee and eight in North Carolina. At least eight bills intended to provide for levying a gasoline tax have been introduced in the legislature of New York State. It is the only state in the Union where a gasoline tax has not been imposed. Illinois enacted a gasoline tax in 1927. It was declared unconstitutional in 1928 by the Supreme Court of that state, however, because of a defect in the drafting of the measure. The decision eliminated the act. In practically every state collecting a gasoline tax of under five cents a gallon, the tendency seems to be toward increasing the levy. This upward swing of the tax rate for gasoline has been credited with counteracting any tendency toward a marked rise in fees for passenger car registration. The effect evidently did not extend into the bus and truck field where such fees have been increased noticeably.

The buoyant trend in many imposts concerning automobiles has been characterized in several isolated instances as inimical to the continued growth and prosperity of the automotive industry. To date, apprehensions on that subject have not come true, as statistics will show, and there is a general belief that the natural working of the economic balance will cause changes to be made quickly in any legislation that definitely applies the garrote to the world's largest industry.

Interest also has been apparent in the industry in such legislative topics as the Hoover Code, compulsory automobile liability insurance, the numerous bills for reducing the accident quota and promoting safety, the growing movement to eliminate specific speed limits and to substitute therefor penalties for heedless and reckless driving, the "thumb-jerker" bills drafted to make hitch-hiking a misdemeanor and similar ones designed to relieve the driver of liability for injuries suffered accidentally by non-paying passengers, bills to regulate equipment and to provide for the inspection thereof, contemplated traffic rule revisions, proposals for examining applicants for drivers' licenses, attempts to discourage the use of solid rubber tires, the tendency toward reducing the gross weight that a vehicle may carry on the highway and the Safety-Responsibility Bill being sponsored by the American Automobile Association. Few bills on those subjects, and, in fact, a comparatively small number in the entire automotive category, have been passed. This fact is an exceptional feature in the legislative activities of the year as compared with those of previous years.

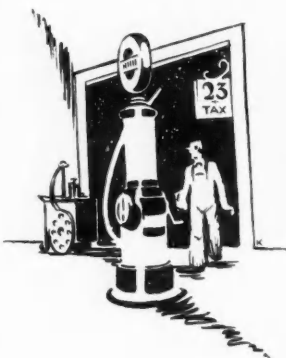
Having a favorable attitude toward the Hoover Code, the industry has watched attentively endeavors made to weave it into the existing legal fabric of the states. In its final form, as approved in July, 1926, by the National Conference of Commissioners on Uniform State Laws and endorsed by the American Bar Association, the code consists of four individual statutes, it will be recalled. They are: "A Uniform Motor Vehicle Registration Act," "A Uniform Motor Vehicle Anti-theft Act," "A Uniform Motor Vehicle Operators'

and Chauffeurs' License Act," and "A Uniform Act Regulating the Operation of Vehicles on Highways." Subsequently there was drawn up a Model Municipal Traffic Ordinance which, in complete harmony with the Uniform Vehicle Code, provides for the regulation of traffic in its local aspects. The Ordinance was completed last summer. The four proposed acts constitute the Uniform Vehicle Code developed through more than two years' work by the National Conference on Street and Highway Safety in cooperation with the National Conference of Commissioners on Uniform State Laws. The National Conference on Street and Highway Safety, of which President Hoover was chairman, recommended the four proposed acts of the Uniform Vehicle Code to the legislatures of the several states. Because President Hoover was chairman of the conference, the Code has become known popularly as the Hoover Code.

Among states that already have adopted the advanced rules of the road based on the Uniform Code, or have revised their laws to gain closer conformity therewith, are: Pennsylvania, New Jersey, Virginia, North Carolina, North Dakota, Idaho, Michigan, Minnesota, Arkansas, Louisiana, Arizona, Washington, New Hampshire, California and Oregon, according to the National Conference on Street and Highway Safety. Pennsylvania repealed its various laws and adopted practically the complete Code, while North Carolina, North Dakota and Idaho adopted all save the licensing act. The action of New Hampshire, California and Oregon was in the nature of the revision of existing laws. The states most recently acting were Louisiana and New Jersey, the latter's action being directed toward uniformity of municipal ordinances as well as of state laws.

Although many cities have incorporated in their traffic regulations at least the salient features of the Model Municipal Traffic Ordinance, it is yet too soon to obtain statistics on its operation on a large scale since the ordinance is less than a year old. The San Francisco Traffic Survey Committee, consisting of a group of business men and traffic experts, reported after a few months' experience in that city with a new code that was said to harmonize very closely with the Model Municipal Traffic Ordinance that a reduction in the number of accidents after it went into effect ranging from 30 to 40 per cent had been recorded by three companies operating 50, 100 and 400 vehicles respectively. The Market Street Railway Co. of that city reported a reduction of 24.7 per cent in pedestrian accidents and no fatal accidents in the central traffic district had been entered in the coroner's records since the ordinance went into effect. The committee added that a saving of \$2,000,000 a year in the cost of automobile accidents would be realized for vehicle owners of San Francisco by reason of the new traffic regulations. It was reported that in Los Angeles, after the adoption of similar traffic measures, there was an increase of about 30 per cent in the movement of traffic on the streets.

Indications are that the experience of Massachusetts with its compulsory automobile liability insurance law has caused other states to refrain from considering seriously that form of legislation. The law was enacted in 1925 and became effective Jan. 1, 1927. It required all owners of motor vehicles to carry liability insurance to assure the payment of any judgment obtained in a





A view of
the Denver
Capitol which has a
\$40,000 gold dome

suit brought to recover damages for death or personal injuries caused by a motor vehicle accident.

Modified forms of the compulsory liability insurance law have been enacted by Maine, New Hampshire, Vermont, Rhode Island and Connecticut. They are based on what is known as the financial responsibility plan, and do not require all owners of motor vehicles to carry insurance. They differ in that no owner is compelled to take out insurance until certain contingencies have arisen, such as result from an accident, or violations of the motor vehicle statutes. In actual operation, under those modified plans, only a small percentage of all the owners in any of the aforementioned states are required to carry insurance. The laws in the first four mentioned states have been in effect less than two years, while the Connecticut statute has been in force since Jan. 1, 1926. It seems doubtful if any one of the plans thus far advanced will solve the problem of liability insurance. Massachusetts has been considering the repeal of its law.

Consideration has been given a compensation insurance plan, but no state has adopted it. Under that plan, a special board, somewhat similar to a workmen's compensation board, would be set up. It would compensate persons injured in automobile accidents at a given rate regardless of who was at fault. To sue for damages, the injured person would have to waive the compensation. The plan would be financed with fees paid at the time motor vehicles were registered. State fund insurance is another conception of liability insurance differing from the compensation plan in that the set amounts paid in by automobile owners would not be disbursed as compensation but to satisfy court judgments rendered in damage suits brought as a result of automobile

accidents. Many states have been considering both plans, but it seems unlikely that either will be incorporated in a law by any of the legislatures in session in those states.

The Motor Vehicle Conference Committee states in its pamphlet on "Compulsory Automobile Liability Insurance" that it has been estimated carefully that the total annual cost of compulsory insurance to all the motorists in the United States would be about \$600,000,000. "It is extremely doubtful," says the pamphlet, "in the absence of statistics, that the total amount of uncompensated damages due to motor vehicle accidents would approach anywhere near this figure."

"Since there are, as yet, no facts which indicate that Compulsory Liability Insurance has, or will, reduce the number of accidents," continues the pamphlet, "and, since there are no available facts or statistics to show the complete amount of uncompensated losses due to motor vehicle accidents, the Motor Vehicle Conference

Committee is opposed to the enactment of Compulsory Automobile Liability Insurance laws, until it can be definitely established that such legislation will accomplish the desired results. The committee strongly urges that other states withhold legislative action on this subject until time and experience have proved the success or failure of the existing plans."

The plan the American



Automobile Association endorses is outlined in its "Safety-Responsibility Bill." The bill has been introduced in a few states, and may be enacted into law in 1929 by one or more of them. It was suggested that the bill might be enacted as a substitute measure in a state where compulsory automobile liability insurance was believed necessary. Certain lawyers have described the bill as being modeled after the Connecticut law with the New Hampshire law hooked into it, and as having more "teeth" than either.

As outlined by Owen B. Augspurger, Chairman of the Compulsory Automobile Liability Insurance Committee of the American Automobile Association, the



proposed law of that organization embodies the following four cardinal principles:

"First, it provides for the enactment of the Uniform Motor Vehicle Operators' and Chauffeurs' License Act by all states that do not now have such a law on their statute books. The control of the privilege of driving rests with each state, and it is

obvious that control is more complete in those states requiring drivers to secure operators' licenses.

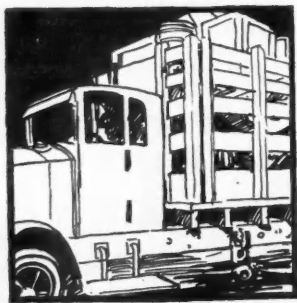
"Second, it provides for mandatory suspension of the driving permits of all persons found guilty of serious violation of motor vehicle laws. In addition to whatever penalties the state laws provide for these offenders, the safety-Responsibility Law definitely bars them from the road until they have established satisfactory proof of their financial responsibility against future injuries to persons or property.

"Third, it provides for the suspension of the driving rights of all persons against whom a final judgment establishing the driver's negligence has been legally rendered and who have failed to meet the judgment. This suspension is to remain in effect until the judgment has been satisfied and until a future guarantee of financial responsibility has been established. While this provision does not absolutely guarantee the payment of a final judgment, the prospect of permanent expulsion from the road is such a compelling alternative that it will inevitably tend to secure the essential payment of such in time to reduce unpaid judgments to the vanishing point.

"Fourth, it provides for the insertion in the driver's license law of every state of a proviso which will forbid the issuance of a permit to any person whose right to drive is at that time suspended in any other state because of failure to respond in damages or because of other serious violations of motor vehicle laws. This, in effect, provides for inter-exchange of suspension rulings, as between the states, and would render the dis-

ability nationally reciprocal."

Plainly evident from the mass of bills intended to promote safety is the growing movement throughout the country to eliminate grade crossings. The campaign against intoxicated drivers and the transportation of liquor in motor vehicles is being continued. Another marked tendency



in the domain of accident prevention is toward the elimination of explicit speed limits and the substitution of penalties for heedless and reckless driving. Michigan and Connecticut took the lead in that type of legislation with measures enacted in 1927. The general inclination has been to permit greater speed.

Closely associated with the subject of safety legislation is the question of liability of the automobile driver for injuries suffered accidentally by non-paying passengers. Connecticut advanced the idea of freeing the driver from that legal responsibility with a law passed in 1927, which is qualified with the provision that the statute applies only where the hurts were not the result of the willful intent of the driver. Endeavors have been made to repeal the enactment in Connecticut, while bills outlining similar measures have been introduced in approximately 90 per cent of the legislatures in session this year. It is in this connection that the so-called "thumb-jerker" bills to make hitch-hiking a misdemeanor have been considered.

The usual number of bills to regulate the kind of equipment carried by automobiles has been introduced. The parts chiefly concerned in this category are headlights and brakes. Provisions for their inspection were contained in many of the proposed enactments. Louisiana requires the periodical inspection of brakes, for example. Most legislation calling for inspection of motor vehicles is of a blanket nature and authorizes highway patrolmen to function as inspectors.

The preponderance of suggestions for traffic rule revision comply with the "Uniform Act Regulating the Operation of Vehicles on Highways" of the Hoover Code. The industry in general approves of that kind of legislation, and also proposals for licensing and examining drivers in accordance with the Hoover Code. To extend any provision for examining drivers further than is recommended by the Hoover Code, however, would be objectional to the industry.

The "Uniform Motor Vehicle Operators' and Chauffeurs' License Act" of the Hoover Code provides that:

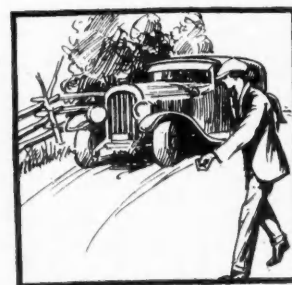
No person shall drive a motor vehicle on a highway unless licensed by the state vehicle department, except those driving road or farm machinery or operating an official vehicle of the United States Army or Navy.

Non-residents over 16, licensed at home, are exempt; if coming from a non-license state, they may drive their own cars for 30 days.

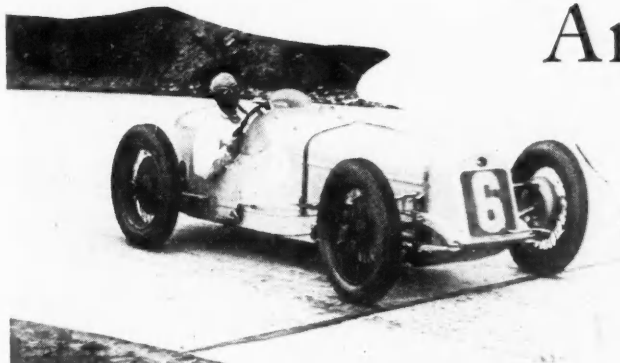
Licenses shall not be issued to persons under 16, or chauffeurs' licenses to persons under 18; nor to habitual drunkards, drug addicts, the insane or feeble minded, those unable to understand signs in English, and those afflicted with such physical or mental disability or disease as to prevent reasonable control over a motor vehicle.

When the law first is enacted, all persons who have driven for one year and have a favorable record may

(Continued on page 482)



Delage and Talbot Entries Are Made for Indianapolis



Straight eight Delage to be driven in 500-mile race by Louis Chiron

Both cars straight eights. Chiron is to drive unbeaten Delage.

A DELAGE racing car with an eight-cylinder engine piston displacement of $91\frac{1}{2}$ cu. in., has been selected by Louis Chiron, champion European race driver in 1928, as the car he will drive in the Indianapolis 500-mile race this year. Chiron's entry into the big American race was announced Feb. 16 in *Automotive Industries*, but at that time he had not chosen the car which he would drive.

One French-built Talbot racing car, to be handled by an Italian, also is announced for the Indianapolis race. This car, designed by Engineer Bertarioni, formerly of the Fiat company, is a straight eight job with roller bearing crankshaft and connecting rods, supercharged from a Roots blower and a Solex carburetor. The feature of the chassis is a girder type frame of sufficient height to act as body. A year ago the Talbot company sold these cars to the Italian driver Materassi, and it was while driving one of them that he was killed at Monza, last September.

Although Chiron has been racing since 1925, this will be the first time he has driven any make except the Bugatti. The Delage which he will pilot at Indianapolis is recognized as one of the finest cars of its type in Europe and has never been beaten in any race. Designed by Engineer Lory, its cylinder dimensions are 55.8 by 76 mm.

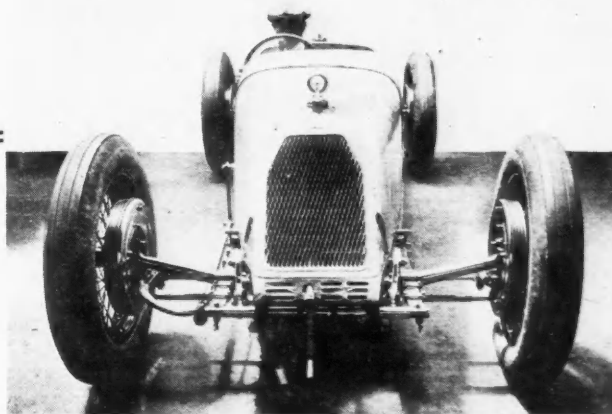
Valves are inclined in the head, operated by two overhead camshafts driven by a train of gears. A Roots blower is driven off the nose of the crankshaft and is fed from a Cozette carburetor. Crankshaft and connecting rods have roller bearings. Lubrication is of the

dry sump type, with the oil tank by the side of the driver's seat. Built for road work, the Delages have a five-speed transmission, the fifth being geared up. The cars have four-wheel brakes with a mechanical servo. According to the European rule, they have enough width for two persons, but the mechanic's place is occupied by the oil tank. Maximum height is 37 in. The engine turns up to 7500 revolutions and develops 150 hp.

Chiron shipped his Delage about the middle of March and will sail for New York himself early in April. This sensational European driver is 30 years old and a native of Monte Carlo. Although a neutral in the World War by nationality, he volunteered in the French Army at the age of 17 and served four years in the artillery. He drove the fastest race ever run on the Lasarte circuit.

CONDITIONS governing the 1929 500-mile Grand Prize of America race scheduled to be run May 30 on the Indianapolis Motor Speedway are practically the same as those for 1928. The entry blanks call for the distribution of \$50,000 to the first ten drivers to complete the race, making the fifteenth time that amount has been offered by the Speedway. There will be an additional sum for a consolation prize to all starters not finishing among the first ten. The amount has not been announced, but for several years the speedway owners have paid \$10,000 in consolations.

The race will be the final one of its class run over the two and one-half mile brick course. It will be the last appearance there of the small-engined, narrow-bodied racing cars. Next year's entry blanks will call for an entirely different and larger type of motor car. To be eligible to start, cars must show an average speed of ninety miles an hour for four complete laps. The first day for qualification will be May 25, the Saturday preceding the race. Every car is entitled to three trials in which to attempt to equal the speed requirement.



Head-on view of straight eight Talbot that is entered for Indianapolis race

Citroen *Keeps Pace With*



Andre Citroen

SINCE changing over to the two present models, a four-cylinder of 99 cu. in. piston displacement and a six-cylinder model of 149 cu. in., known respectively as the C-4 and the C-6, the Andre Citroen Company of Paris has expended \$6,000,000 for improving its plant and obtaining new machinery. An additional \$2,000,000 worth of machinery has been ordered. It is stated that 97 per cent of the new machinery has been purchased in the United States.

In March, 1928, several engineers were sent to the United States with the drawings of the more important parts of the new models and with instructions to purchase the most modern machinery available for their production. Shipments began in June and reached a peak in July. The factory was partly closed for three weeks in August, for the change-over, and in September it was in production again at the rate of 200 cars per day. In January, 1929, the production stood at 400 cars per day; by March 15 it was to have been 500, and it is expected to be 600 in August. The plant is being laid out with a view to producing 1000 cars per day, that rate to be reached by progressive stages.

Immediately at the end of the war, Andre Citroen embarked on the Utopian program of producing 100

*French manufacturer expends
obtain new machinery, 97 per cent of
States. Orders have been placed for
equipment. His engineers keep
and quickly adapt them*

cars per day, a task which had never been attempted by any European manufacturer. He had the disadvantage of possessing a plant laid out exclusively for the production of shells, and a name that was totally unknown to the then restricted automobile buying public.

The utter disorganization throughout Europe at that time caused unexpected but inevitable delays. The first cars appeared in October, 1920, and by the beginning of 1922 the output of 100 per day had been attained and maintained. During the interval, a 5 hp. car had been added to the original 10 hp. car. In 1924, the Budd all-metal body was introduced, and production rose to 250 cars per day, despite the dropping of the smaller model. In 1926, the B-14 was introduced, to be replaced at the end of 1928 by the two present models, the C-4 and the C-6.

Andre Citroen's bold initiative in breaking into the automobile industry and in embarking on a scale of production entirely foreign to European ideas, has revolutionized the industry on that side of the Atlantic. He aroused other makers from their torpor by proving the possibility of producing in Europe on American mass production lines.

The present models are entirely new. Until the end of last year, Citroen never had built a six, and the new four-cylinder was also a distinct departure from the one it superseded—the engine, transmission, rear axle, frame members and front axle all being new.

The "four" and the "six" have the same bore and stroke. They are of the same general design, and many of the parts are common to the two. Many of the machining operations are the same and a large number of the fixtures are used on both the four and the six. It is stated that by reason of this unity of design, the saving in the cost of machinery and plant is about 50 per cent.

One of the underlying principles is that in order to keep abreast of public requirements, improvements must be made every year, important changes will be necessary every two years, and an entire change of model may be required every three years. The new plant has been laid out with this in view, and a high degree of flexibility has been sought. This is seen in the importance given the tool plant, employing 500 persons out of a total of 30,000 in the factory. Citroen manufactures all of his own drills, taps, milling cutters, jigs, gages and fixtures, and has facilities for modifying machine tools. It is claimed that it is largely because of these independent facilities and the

American Mass Production

\$6,000,000 to improve his plant and which was purchased in the United an additional \$2,000,000 worth of watch on developments here to the company's system

By W. F. BRADLEY

swiftness with which they can produce and adapt new tools, that Citroen can carry out changes in design with rapidity.

Dependence on American machine tool makers is admitted, but the fact that the Citroen factory is separated by the ocean from that source of supply does not place it in an inferior position. A technical office is maintained in New York and another just has been opened in Detroit. Practically every departmental head has visited the United States. Last year, the chief production engineer made three trips to America and the chief engineer crossed the Atlantic 10 times. The object of the engineers is not to investigate machinery and methods already known, but to keep acquainted with the new tools and new methods being developed by machine tool makers. In this way, new machinery can be obtained as soon as it is placed on the market, and it is claimed that it can be installed and put into operation in less time in Paris than in Detroit.

The Citroen works consist of six groups of factories. Two of these, the Javel and the Gutenberg works, are within the city limits of Paris and four are in the environs. They are connected by a regular service of tractors and trailers. It is maintained that under conditions prevailing in Paris it would be impossible to house the entire works under one roof, the main difficulties being in supplying electric current, compressed air and water, and in housing the workers.

The foundry and forges are at Clichy, on the northern outskirts of Paris. At St. Ouen, a short distance away, are the presses on which the Budd all-metal bodies are produced, and the electric welding plant. Springs are produced at the Epinettes factory, in the same district. The former Bayard Clement factory, at Levallois, pro-

duces body hardware, windshields, etc., also ball bearings.

There are four main factories within the City of Paris, these constituting the original Citroen works. At the Grenelle factory, front axles, steering gears and rear axles are machined and assembled. The Felix Faure factory is given over almost entirely to auto-matics. At the Gutenberg factory, engines and gear-boxes are machined and assembled, while at the Javel factory is the chassis assembly line, and the body assembly, painting and the delivery shops. The commercial offices form a part of the Javel factory. The experimental department is entirely independent of the production shops, and is installed in the former Mors factory, in the Rue du Theatre. There also is an independent factory for the production of Citroen-Kegresse creeper track machines.

The total floor area of the various works is 173 acres. The employees number 30,000. There are 12,000 machine tools used and the driving power totals 35,000

hp. All new machines are painted gray when installed to distinguish them from the older machines, which are painted black.

While the foundry, forges and presses in the factories outside Paris are the most modern in Europe, and have been equipped with the aid of American engineers, the most recent plant, and the one on which the expenditure of \$6,000,000 has been made, is that for producing the two types of engines. No other factory in Europe is its equal in equipment, and it is claimed that there are not more than two of its kind in America.

The greatest outlay in new equipment was for facilities with which to machine cylinder blocks. Cylinder production employs three main groups of machines, as follows:

Group 1 provides for 19 distinct operations.

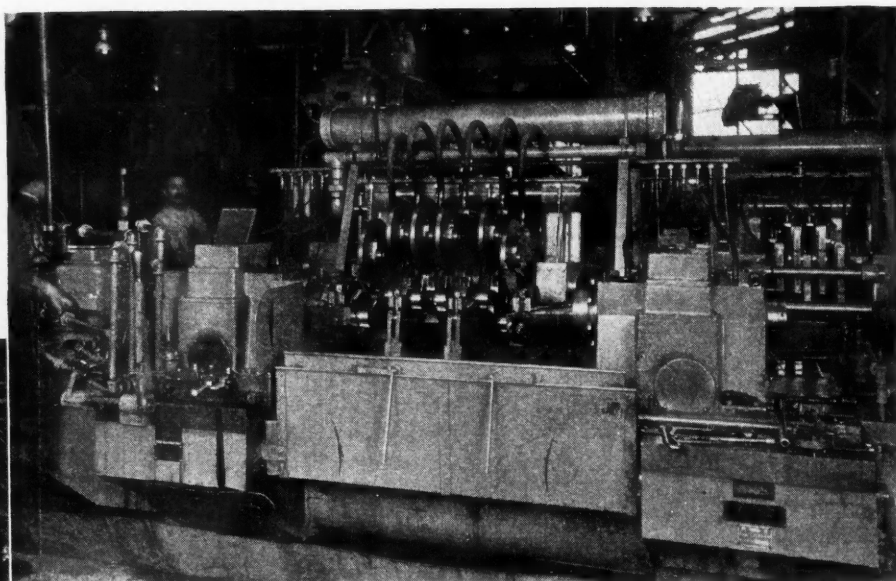
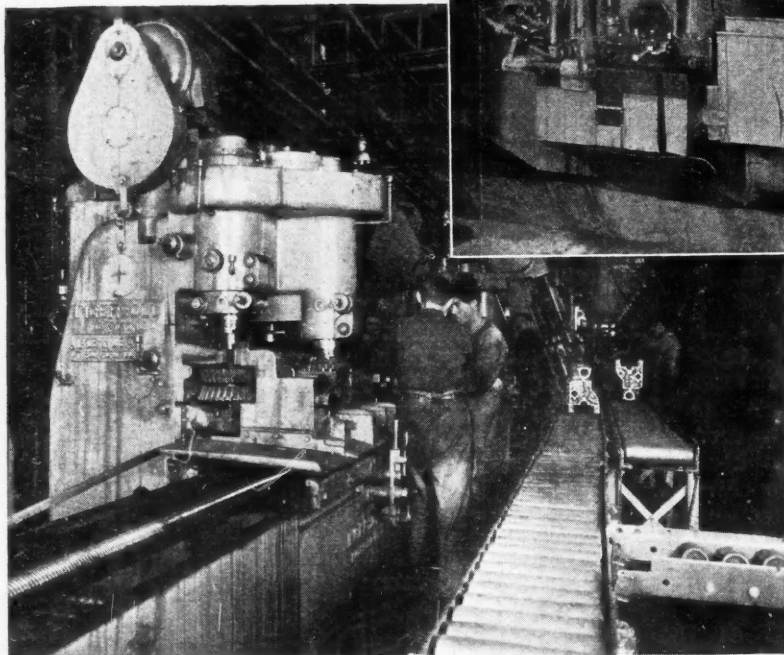
The cylinder blocks, received from the foundry at Clichy, are washed and painted internally. The first operation consists of milling the top and bottom surfaces on an Ingersoll semi-automatic drum-type milling machine, receiving five six-cylinder blocks or seven four-cylinder blocks. The locating holes are drilled on a Foote-Burt four-spindle machine with automatic feed. The front and rear faces are milled on an Ingersoll

EVIDENCE of the competition being offered to Citroen in France was noted recently in a dispatch from Paris published in The New York Times. It stated that the price of the cheapest Ford had been reduced to 25,700 francs (about \$1,004), or practically the same price as the four-cylinder Citroen, despite a 45 per cent tariff that must be paid on the American car. The dispatch went on to say that other Ford models will be priced to meet similar Citroen models, "thus giving the American and the 'French Ford,' as the Citroen sometimes is known, an even break in France and other Continental countries."

Andre Citroen has been quoted as saying that every twentieth person in France is an automobile prospect. His company now makes more than a third of the automobiles sold in France. He is said to have estimated that total car sales will be about 1500 a day in France during the next seven or eight years. France now has a million cars and trucks.

Right—A battery of 12 Walcott crankpin turning lathes is in use

Below—An Ingersoll automatic is used for milling main bearing surfaces and the water joint



drum-type vertical milling machine carrying six blocks of cylinders. The other operations performed on an Ingersoll semi-automatic are milling of valve cover surface and intake and exhaust faces. An Ingersoll automatic carrying six milling cutters is used for milling the main bearing surfaces and the water joint. Cylinder boring is done on two vertical Ingersoll boring machines, one performing the rough boring and the second machine the finish cut. The two machines, each operated by one man, have a capacity of 50 cylinder blocks per hour, although at present they are not required to maintain that rate of output in order to keep pace with the other departments.

Oxy-Acetylene Welding

Other operations done on this group of machines are rough-boring crankshaft and camshaft bearings, on a Barnes semi-automatic boring machine, with revolving table; drilling valve guides on a vertical Foote-Burt 24-spindle machine; the finish boring of same; drilling water circulation hole on a Hammond drill press; drilling and tapping Delco distributor shaft bearing, on an Avey drilling machine with automatic feed; chamfering cylinder barrels on a Citroen machine; drilling dowel pin holes for main bearings and drilling inclined oil feed holes on an Avey six-spindle drilling machine.

Twenty-two distinct operations are performed by the second group of machines. The most important of these are drilling by a Natco multiple-spindle drill of all the holes on the head, base, left and right sides of the block and front and rear faces, the net time for the entire operation being 4 minutes per cylinder block. A Natco

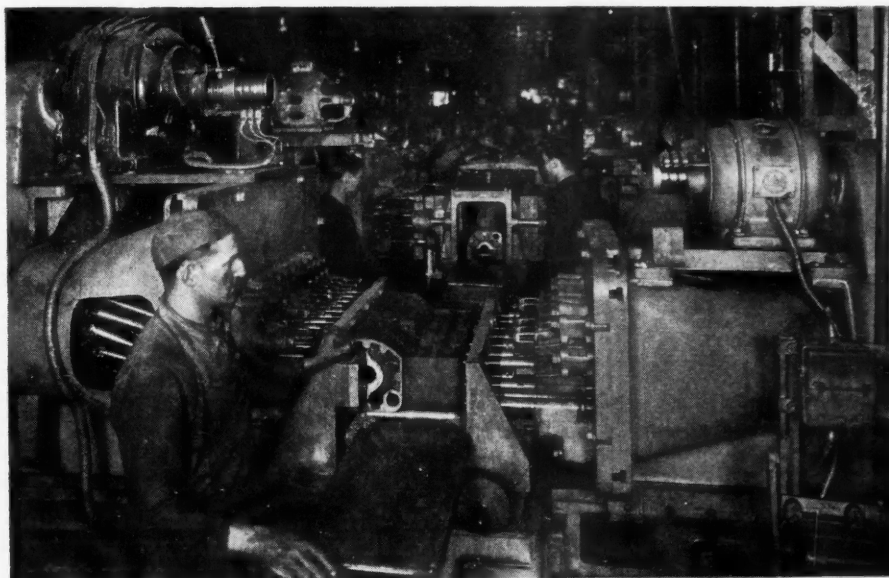
machine is used also for tapping the holes on cylinder head and base, front and rear, and left and right-hand sides. The valve spring seats are spot-faced in a Foote-Burt 12-spindle drill press. After smaller drilling and tapping operations, the cylinder barrels are honed in a Barnes semi-automatic machine, the tolerance on the finished diameter being .001 in. The blocks are washed in a machine of French construction and are given a water test in a Citroen semi-automatic device.

In the third group, there are 14 operations. They include the final milling cut of the top of the cylinder block, on an Ingersoll semi-automatic milling machine; fixing studs for bearing caps, mounting main bearing caps and boring main bearings on a Barnes horizontal boring machine; reaming the bearings on a Barber reamer; pressing in valve stem guides on a hydraulic press; spot facing the valve seats on a Citroen machine; final milling cut on the rear face of the cylinder block, with a Milwaukee semi-automatic; milling the valve seats on a 12-spindle vertical Foote-Burt machine, and grinding the 12 valves simultaneously on a Foote-Burt machine.

The total of 55 operations on cylinder blocks, from the reception of the casting to grinding valves, washing and cleaning with compressed air, ready to go onto the assembly line, occupy 150 workmen, who produce 400 cylinder blocks per day of 8 hours.

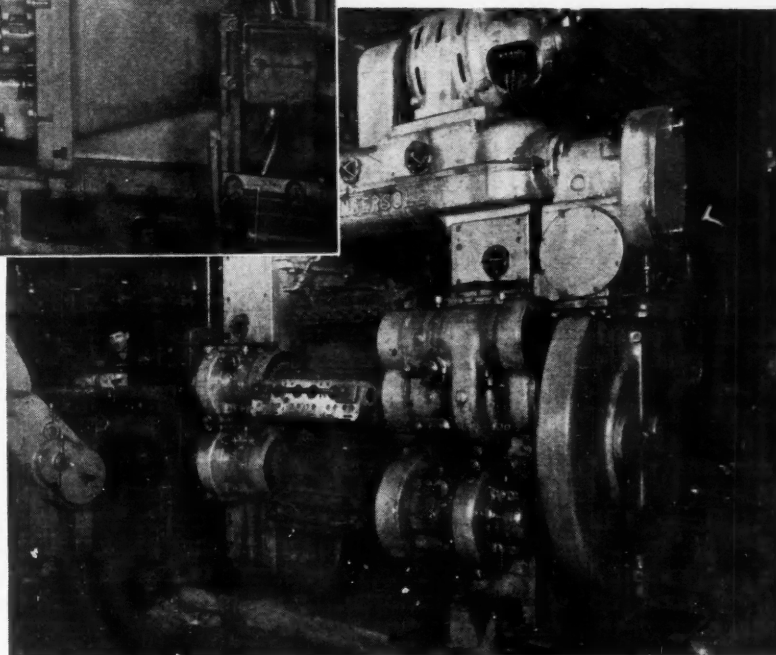
The plant laid out for the machining of other engine parts is entirely new and for the most part is of American origin. Connecting rods are babbitted direct, without a bronze backing, in a Chadwick machine, while the main bearings are babbitted in a Toledo machine.

Crankshaft production, comprising 65 distinct operations, is performed almost entirely on American machines, among them a battery of 12 Walcott crankpin turning lathes. Bohnalite invar-strut pistons are used on both models. After being imported for a few months, they now are cast at the St. Ouen foundry and machined at Javel, the production being under license. The engine test room is equipped with 40 Heine electric brakes. Each engine is run in, tested for power, passed through the silence room, stripped for examination and washing, and reassembled. The engines are sent to the test room with their transmissions. At the end of the assembly line, there is a final chassis test on rollers.



Left—Drilling holes in the head and base of the cylinder block with a Foote-Burt spindle drill

Right—This view gives a close-up of the operation of milling cylinder blocks on an Ingersoll drum-type milling machine



New Fuel Injection Method for Oil Engines Designed

A NEW method of fuel injection for oil engines designed to render them more flexible was described recently by M. F. Rochefort before the French Academy of Sciences. M. Rochefort employs a combined mechanical and pneumatic injection method, with an entirely new system of atomization, utilizing for the injection, instead of pure air, gas already carbureted to the proper degree and furnished by the engine itself.

At the beginning of the compression stroke, a valve uncovers a port through which an auxiliary chamber filled with carbureted gas discharges into the cylinder. The gaseous jet cuts transversely across a very thin liquid sheath, laminated by the injection pump in front of the outlet from the auxiliary chamber. This results in the atomization and the homogeneous intermixture of the liquid fuel with the charge of air in the cylinder, so the inventor claims. Once the equilibrium has been reestablished, the ascending piston returns into the auxiliary piston a portion of the gas which has thus been normally carbureted. Just before ignition occurs, the passage to the auxiliary chamber is closed, thus isolating in the auxiliary chamber a quantity of gas of exactly the same composition as that which it contained before the injection.

With this method, it is possible to obtain pressure drops of 4 to 1 and 5 to 1 or even more, which are impossible when atomization is effected by suction, and

which are even difficult to obtain with Diesel atomizers, on account of the high values of the pressure of the air into which the fuel is injected. It results in a very fine atomization, which is further improved by the fact that the preliminary carburetion of the injection gas reduces the proportion between the mass of the liquid fuel and the gaseous mass in which it must be distributed.

This method, moreover, when compared with that making use of an auxiliary compressor, represents an important simplification and also an important gain in efficiency by eliminating the losses in the air compressor.

In the case of a multi-cylinder engine, the chamber takes the form of an intercommunicating collector into which the valve-type of injector nozzles of the various cylinders extend. The intercommunication between different cylinders thus assured is said to result in the most complete intermingling of fuel and air. Engine control is effected by simultaneous action on the air and on the liquid fuel. It is stated that this system may be applied to ordinary carburetor engines by the elimination of the carburetor and addition of injection equipment, and particularly to aircraft engines, to help solve the serious problem of safety in the air. The system is equally applicable to two-stroke and four-stroke engines. Compression ratios, of course, must be kept within the limits permissible with carburetor type engines, which with such fuels as gas oil are low.

Electrical Resistance Measurement Determines Endurance of Metals

Japanese metallurgist presents method for accurately noting point at which elasticity ends.
Time-saving is a feature.

HERETOFORE the determination of the endurance limit for any particular metal, that is, the limit of alternating stress which it will withstand for at least 10,000,000 cycles, has been a rather tedious procedure. For instance, at 1000 r.p.m., it takes about a week of continuous running to produce 10,000,000 complete cycles of stress. Any method which makes it possible to determine the endurance limit in a shorter time should therefore be of interest.

Such a method was described, and results with it were presented at a special meeting of the Philadelphia Chapter of the American Society for Heat Treating by Dr. Kotaro Honda of Tohoku Imperial University, Sendai, Japan. Dr. Honda had come to this country in connection with the Western Metals Conference in Los Angeles and had accepted an invitation by the Philadelphia chapter to speak on this new method for quickly determining the endurance limit.

The method referred to was originated by Shoji Ikeda of the Japanese Government Railways Research Department, and a paper describing it was presented to the Society of Mechanical Engineers of Japan some time ago. In this test a test specimen similar in shape to those used for other endurance testing machines is prepared, and is placed in a machine in which it is rotated while subjected to a bending stress. While in this machine and subjected to the alternating stress, the electrical resistance between two definite points of the specimen is measured. It is found that there is no change in the electrical resistance with increase in stress up to a certain point. Then the electrical resistance begins to increase, at first slowly and gradually more rapidly. The explanation is that at the stress at which the resistance begins to increase, slippage at the cleavage planes of the crystals of the metal begins. Below this stress the material is perfectly elastic and

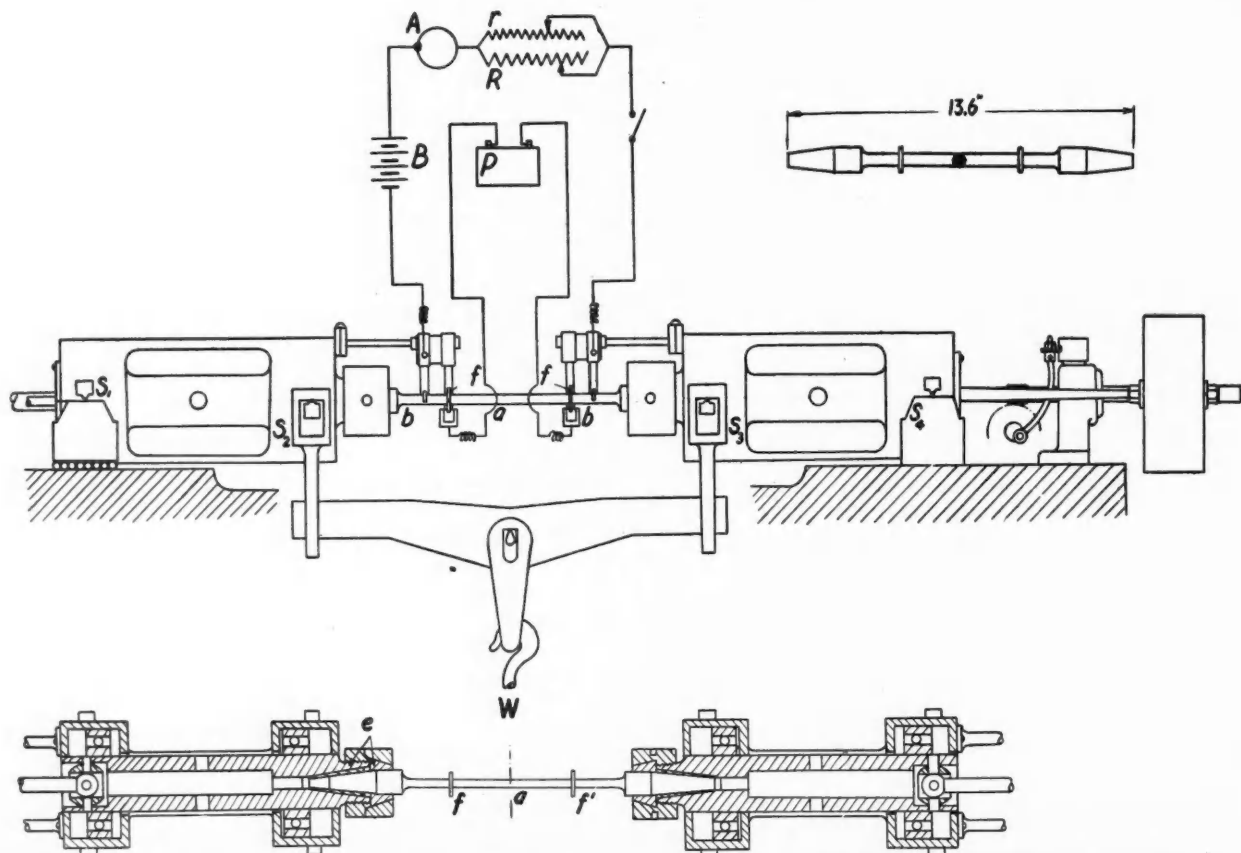


Fig. 1—Prof. Ono's rotary endurance test machine with electrical equipment for measuring resistance of specimen

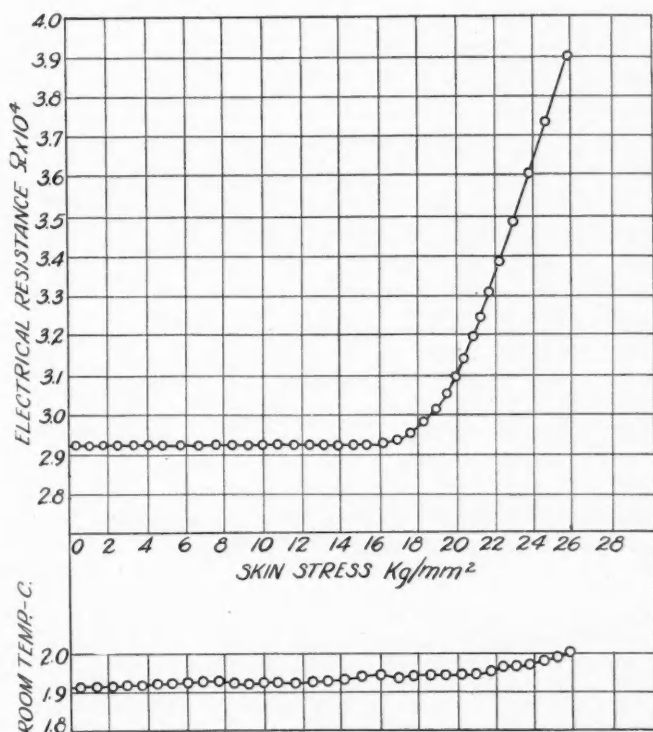


Fig. 2—Variation of electrical resistance of specimen with dynamic stress

no internal work is being done on the specimen, but above this stress non-recoverable work is being done on the crystals, and it is this work, resulting in slippage at the cleavage planes, which ultimately results in failure of the specimen. Hence the point at which the electrical resistance begins to increase is the endurance limit. An interesting relation was found to exist between the endurance limit as thus determined and the scleroscope hardness.

The endurance machine used in the test is illustrated in Fig. 1. It is based upon one designed by Prof. Ono, to which Mr. Ikeda added the equipment necessary for measuring the electrical resistance between two flanges on the specimen. The specimen is held in hard rubber chucks to insulate it from the machine, so that there is only one path for the current between the two flanges. When the knife edges S^2 and S^3 carry a load of $W/2$ each, the bending moment has a constant value at all points between them, hence all cross sections of the specimen are stressed equally.

The distances between knife edges 1^1 and S^2 and between S^3 and S^4 , both being 20 cm., the surface stress in the specimen is

$$S = \frac{32}{\pi} \times \frac{200}{d^3} \times \frac{W}{2} \epsilon = 1018.6 \frac{W}{d^3}$$

where S is the maximum surface stress in kg./mm^2
 W , the load applied, in kg.

d , the diameter of the specimen, in mm.

The resistance of the specimen between the flanges is measured by sending a current of 10 amp. from a 100-volt battery through it by means of brushes b, b , bearing on the specimen. Two rheostats R and r are provided for adjusting the current to this value of 10 amps., rheostat r being for fine adjustments. A pair of brushes f, f , bearing on the flanges of the specimen, connect to a Leeds & Northrup potentiometer P . As the current flow through the specimen is kept constant the resistance of the specimen between flanges is obtained from Ohm's law, $R = E/I$. The degree of

accuracy with which resistance measurements can be made by means of this apparatus is said to be 1/1,000,000 ohm. To reduce the contact resistance at the flanges to a minimum, both flanges are cleaned with dilute sulphuric acid and the flanges are then revolved in baths of mercury.

In starting the test, the potential drop between flanges is first measured without any load on the specimen, and the machine is run in this condition until a state of equilibrium (constant resistance) is reached. Then a weight of 0.5 kg. is applied after every 3000 revolutions, and immediately after 3000 revolutions the potentiometer is read, the reading being taken with the machine in motion. The number of revolutions between observations is referred to as the measuring interval and was usually 3000.

All tests of which results are plotted herewith were made of Swedish steel, test specimens having been prepared from five different melts of the following compositions:

TABLE 1

Melt. No.	Result of chemical analysis					Temp. coeff. of elect. resistance 0°—100° C
	C%	Mn%	Si%	P%	S%	
2907 H	0.11	0.42	0.01	0.015	0.021	5.020×10^{-3}
1312 H	0.22	0.44	0.02	0.014	0.018	4.830×10^{-3}
2447 H	0.41	0.35	0.25	0.028	0.020	3.555×10^{-3}
2563 H	0.69	0.23	0.27	0.027	0.023	3.465×10^{-3}
2713 H	0.88	0.24	0.29	0.024	0.021	3.250×10^{-3}

Fig. 2 is a plot obtained from results on one specimen of Swedish steel. Surface stress in kg./mm^2 is plotted along the axis of abscissas and electrical resistance along the axis of ordinates. It will be seen that over a considerable range of stress there was no increase in electrical resistance, but at a stress of 16.33 kg./mm^2 (23,200 lb. p. sq. in.) the resistance began to increase. It increased slowly at first, but gradually the rate of increase became greater and finally the specimen broke. The point at which the resistance began to increase was far below the static proportional limit.

The phenomenon observed is explained by the originator of the method by saying that up to a certain stress the strain energy absorbed by the specimen at every cycle of stress is almost zero, but if the stress is increased beyond that point, slip on cleavage planes or other irreversible changes occur in the internal friction,

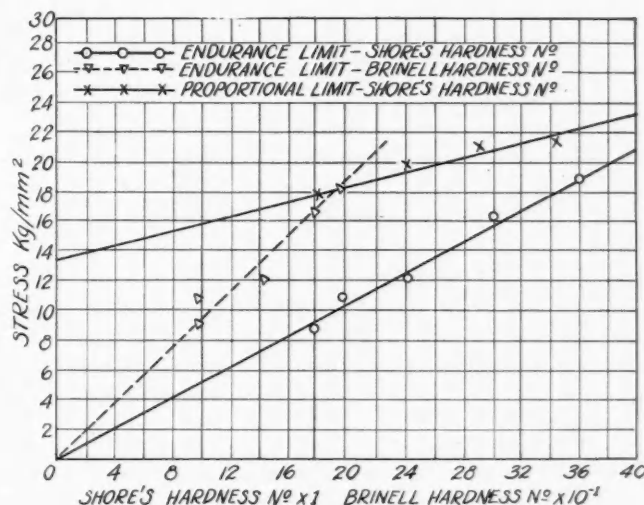


Fig. 3—Relations between hardness numbers, proportional limit and endurance limit

under which condition repetitions of stress heat the specimen and subsequently increase its electrical resistance measurably. The larger the stress the greater the internal damage to the specimen, and finally failure of the specimen results. Hence, the stress at which the electrical resistance begins to increase may be called the "endurance limit."

In Fig. 4 are plotted the relations between the endurance limit on the one hand and the Shore hardness and the Brinell hardness on the other, and also the relation between the proportional limit and the Shore hardness. It will be noticed that the two lines representing the

relations between the endurance limit and the two hardnesses are straight lines and both pass through the point of origin, thus indicating that a material without hardness according to these test methods has no endurance.

A series of tests were carried out to determine whether the measuring interval had any influence on the result obtained for the endurance limit. It was found that while for a given stress above the endurance limit the resistance was greater the greater the measuring interval, up to a measuring interval of 50,000 revolutions the endurance limit was not affected.

New Spring Design Eliminates Center-Bolt Hole

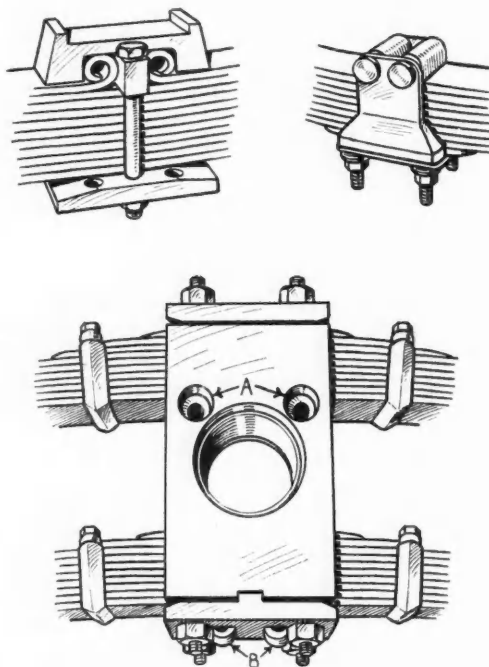
A METHOD of locating springs on axles, or in trunnion blocks, introduced by one of the most prominent spring makers in England (Jonas Woodhead & Sons, of Leeds), is finding favor among the makers of British trucks and buses, both four-wheel and six-wheel. As indicated in one of the accompanying sketches, it consists essentially of dividing the main leaf at the center, forming eyes at the adjacent ends, and utilizing either transverse bolts, a special top clamping plate, or slots in a trunnion block to locate the eyes.

Two applications of this system to single half-elliptic springs are shown in the upper part of the illustration. In the left-hand example, the clamping plate forms a bridge piece over the eyes; a yoke and assembly bolts hold the remaining leaves to a bottom plate; the usual U bolts or their equivalent pass over the bridge piece, through the bottom plate and through the spring pad on the axle, and the latter may or may not have holes or recesses for the nuts or heads of the assembly bolts. Various possible modifications of detail suggest themselves, but in any event the central assembly bolt passing through holes in the leaves is eliminated.

In the second arrangement for single springs illustrated, lateral bolts pass through the eyes and a form of spring box, which in turn is secured to the axle by means of studs integral with the side plates of the box.

In the case of dual inverted half-elliptics for six-wheelers, the lower view of the illustration depicts a general arrangement that also lends itself to modifications. The trunnion block is drilled laterally at the points A to provide grooves for the spring eyes below the level of the main leaf, while the eyes of the lower spring are accommodated in and located by slots in the clamping plate.

All Woodhead springs are made with integral lugs on two or three of the subsidiary leaves to locate the leaf clips. Thus, the dual inverted springs illustrated have integral lugs at each end of the leaves next to the shortest, which obviate the need for the clips being



Woodhead method of locating springs
by means of divided master leaf

riveted to the main leaf, this eliminating another cause of weakness of that leaf.

Automotive Employment

ACCORDING to the Bureau of Labor Statistics, there still remains much to be done by the automotive industry in insuring greater stability of employment. The bureau has just completed a survey of employment stability in the industry and finds that not only does the industry as a whole make a very bad showing in this respect in comparison with the other industries studied, but that irregularity and uncertainty of employment are the rule among practically all the 78 automotive establishments covered in the survey.

The measurement of stability has been taken as the relationship of average monthly employment during the year to the number of employees in the month of maximum employment. The 78 automotive establishments whose employment records have been analyzed for this study represent manufacturers of automobiles, trucks, buses, bodies and other important automotive parts, except accessories and specialties. Employment stability for these plants was determined for each year beginning with 1923 up to the 12 months ending with November, 1928.

The annual averages for all plants show consistently bad stability conditions with little or no improvement apparent. In fact, with the exception of 1926, each year showed a lower average than in 1923. In every year since 1923, except 1926, the stability index for more than half the plants was under 85. Only two plants out of the 76 had a record as good as 90 per cent for each of the six years.

Per Cent of Full-Time Employment in Automotive Plants						
	1923	1924	1925	1926	1927	1928
Average—78 plants	82.3	78.7	82.0	83.3	80.6	80.8
Highest	97.5	98.8	97.8	97.4	95.3	97.1
Lowest	52.3	49.7	51.7	62.0	48.5	48.3
Per Cent of Plants with Employment of						
95 or over	3.8	10.3	9.0	9.0	1.3	2.6
90 to 94.9	16.7	14.1	10.3	14.1	11.5	12.8
85 to 89.9	26.9	10.3	26.9	32.1	29.5	26.9
80 to 84.9	23.1	16.7	11.5	19.2	23.1	19.2
Under 80	29.5	48.7	42.3	25.6	34.6	38.5

Just Among Ourselves

More Car Makers Are to Build Trucks

WITH the announcement that Hudson and Graham-Paige are to produce a line of trucks, the former around the middle of 1929 and the latter about a year later, the number of sizeable passenger car corporations not yet entered into the truck field is reduced to seven or eight. General Motors, of course, handles its truck output chiefly through General Motors Truck Co., although Chevrolet still markets its own specific line. Chrysler has the Fargo directly associated with the Chrysler company, with the important Dodge line still going full speed. Running down the list we find among the fairly large car producing interests not building or committed to building trucks, Auburn, Franklin, Hupmobile, Marmon, Nash, Packard, and Peerless. Of this group the last three mentioned did at one time produce trucks, but later discontinued them. The Graham brothers, of course, were prominent and successful as truck builders before they grew to importance as car manufacturers.

Problems of the Combination Dealer

WITH the present tendencies, study of the best retail methods for the combination car and truck dealer has been assuming greater importance each year. With many service factors in common, the passenger car and the truck have quite distinct sales problems brought about chiefly by the difference in purpose for which the two vehicles are designed. The buying habits and methods of the car user and truck user differ

materially because of this inherent difference in use to which the vehicles are to be put. That the advantages to be gained from handling a truck line are a good deal greater than the additional problems brought to the dealer, is indicated by the fact that several manufacturers, in deciding to add trucks to their activities, have been influenced largely by requests and demands arising in the dealer organization itself.

"Why Men Dare" Interesting Study

THIS year, as last, the industry's enthusiasm and pleasure in the creation of a new automobile speed record is strongly tempered with sincere grief due to the death of a driver participating in the trials. While it has been generally recognized by drivers as well as designers that Death is a potential hitch-hiker on all 200 m.p.h. automobiles, the specific accident to the specific driver brings always a new and specific shudder. Yet no one can fail to marvel at and admire the courage, even while disparaging the judgment, of those free spirits who still delight to dare utter annihilation for the sake of the thrill or the fame to be derived from such daring For, whatever the basic objective of the designers of such vehicles as the Triplex and the Golden Arrow, it is hard not to believe that the spirit of adventure predominates over that of research in those men who actually drive the cars. For those who set store in psycho-analysis, there would be a vast interest in a scientific analysis of those dif-

ferent emotional and mental forces which lead men to such trials as those of Segrave, Campbell, Lockhart, Keech, Bible and those who have dared equally hazardous ventures in hundreds of other fields.

* * *

Manufacturer Gives Merchandising Text

THE opening paragraphs of an article by C. D. Garretson, president Electric Hose & Rubber Co., in *The Nation's Business*, form a basis for activity as well as for thought among automotive parts and accessory manufacturers. They give a text upon which we are not going to preach any sermon, but which we feel to be worth quoting that individual executives may do their sermonizing for themselves.

* * *

Active Cooperation Urged With Wholesaler

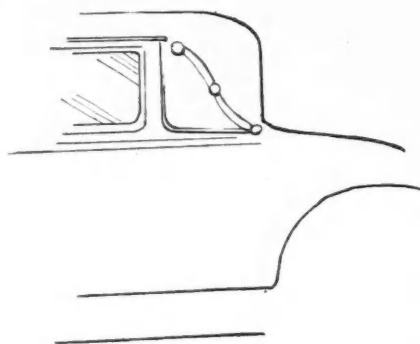
THERE is no denying," Mr. Garretson says, "that our manufacturing industries would languish if any appreciable number of manufacturers were compelled to distribute entirely through the chain and mail systems. Even the largest consolidations of producers require the open channel of independent distribution for their healthy operation. It is therefore necessary for every manufacturer who is worthy to remain in business to join intelligent wholesalers in cooperating with independent retail dealers to aid them in the utilization of principles and methods necessary to meet the new competition."

—N.G.S.

Verve of Automobiles' Should Show in

Character of car best expressed by attention to fundamental principles of mass and mobility, is view of independent observer.

MOTOR cars offer far greater possibilities for improvement in their appearance than their apparently stabilized design would indicate. If current passenger car design tells us anything, it is that too much attention is being given to minor details and not enough to the fundamental principles of design. Generally speaking, current models show a wealth of variety in colors, accessories and structural details and a poverty of originality in design. With few exceptions, the outstanding features of the year's offering are simply reappearances of old forms and practices in new guise,



Designers who have felt the abruptness of bodies terminating vertically in the back have applied the "S" curve quite successfully in the use of the top brace to soften the abruptness and carry the eye down to the rumble in a graceful line

novelties that will attract the public eye.

The automobile is still subconsciously regarded as a horseless vehicle. Its present design is quite naturally an outgrowth of the horse-drawn carriage, reflecting much of that static era with its static costumes and

LIONEL ROBERTSON, the author of this article, has behind him twenty years of outstanding success as a designer and stylist in the furniture and textile fields. He is an artist of established reputation; has lectured at the Art Institute of Chicago, the Brooklyn Institute of Arts and Sciences and elsewhere, and has achieved marked success in various large interior decoration projects.

His comments on automobile design and its future, while controversial in some respects, approach the problem from the viewpoint of those fundamentals which are common to every kind of artistic form creation. The article is presented, not only for its intrinsic value, but with the idea that the views of a competent outside observer may serve as further stimulation to discussion of the important problem of automobile body design.

Comments on Mr. Robertson's article will be welcomed by the editors.

and even here there is a similarity as if resulting from a conspiracy.

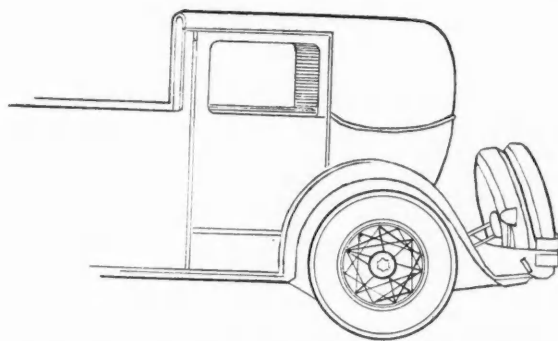
To say that radical departures in design are to be avoided lest they prove to be costly experiments, or to state that a car must be in style to sell in necessary volume, offers no satisfactory answer; rather, it affirms the statement that fundamental principles of design are being overlooked in the rush to create

its slow-moving vehicles. It is, however, a product of the mobile age which it has served to create, and because it is primarily a means of rapid transportation, its design should be such as to make its function frankly obvious.

The functional type of design expresses beauty when it most closely conforms to the simplest and most organic ar-

range of necessary parts from the standpoint of utility. Much progress has been made with it in motor vehicles, but the transition from the coach-and-four has been so slow that it is perceptible only in retrospect. The sport car always has expressed the functional most closely, and has pointed the way for its expression in other models. But those who think that the ultimate has been reached need only examine current design with an eye to its fulfillment of the functional purpose to be convinced that there is much room for further accomplishment.

In applying the functional rule to the design of passenger cars, the first item to consider is the silhouette. The form of the silhouette should, as far as possible, offer no resistance to the forward plunge. Naturally, vertical lines should be suppressed and horizontal lines

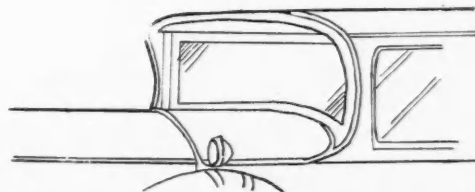


The limousine or sedan type of body, where the peak of the mass ends abruptly in the back, is helped greatly by a spare tire or trunk which, in a manner, affords a tail effect

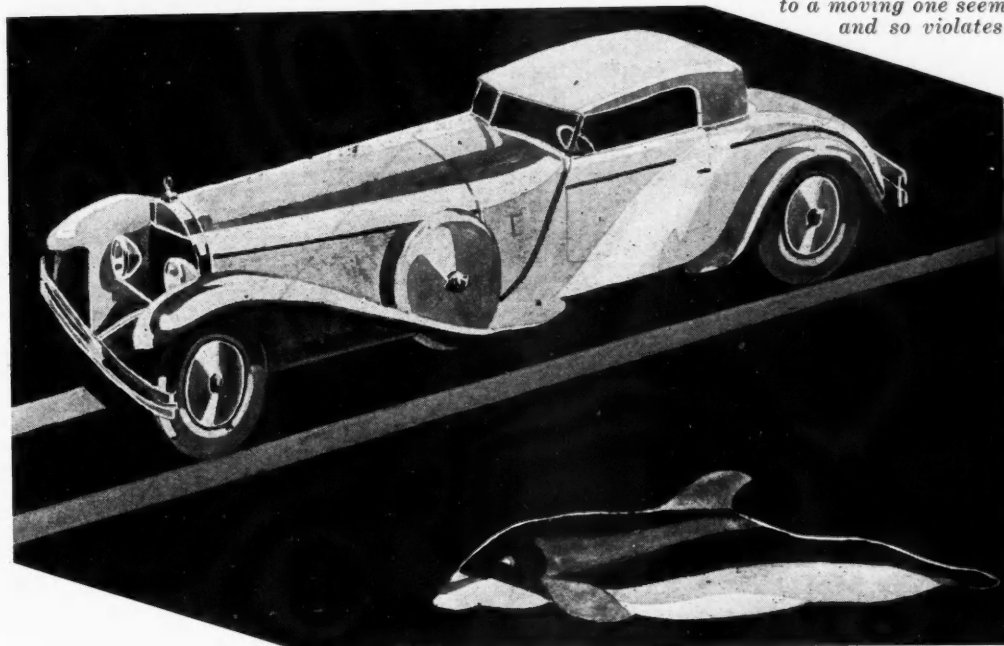
Purpose Body Design

By
Lionel
Robertson

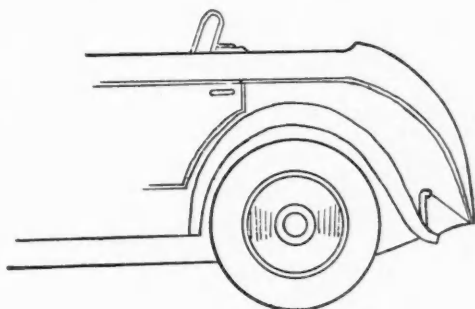
accentuated. There should also be some focal point near the front of the mass from which these horizontal lines diverge, much as in the way of a comet with its nucleus and tail. This effect of fleetness suggested by horizontal lines and the total or partial elimination of vertical ones may be found in other objects where speed is a primary factor. Take, for example, the latest type of steam locomotive with its smokestack lowered to a



The use of a curved plane to the front of the forward pillar, while graceful in itself as applied to a stationary object, when applied to a moving one seemingly obstructs its speed and so violates functional design



The dolphin was used as a characteristic form in applied design from the time of the classic Greeks down to the Empire period. The accompanying illustration shows a Mercedes-Benz body, the design of which might easily have been inspired by this swiftly-moving fish



Saoutchik has added to the fleetness of appearance of the Mercedes-Benz design by terminating the body in the rear with a harmonious curve. An American attempt at the same effect is found in the Chrysler Imperial phaeton

minimum, the ocean liner with its smokestack raked, and the example par excellence, the airplane. The functional characteristics in the design of these objects give them beauty of line. To quote a significant statement from a prominent airplane manufacturer, "the more the relation of the wings and fuselage conform to what we know as beauty the more perfect the plane is from an engineering standpoint."

Suggestions for silhouettes may be gleaned from examples provided in the rapidly moving bodies of nature. The

trout, swallow, gazelle and dolphin are notable. The dolphin has been used as a characteristic form in applied design from the time of the classic Greeks down to the Empire period. The accompanying illustration shows a Mercedes-Benz body, the design of which might easily have been inspired by this swiftly-moving fish.

There have been many attempts to superimpose on bodies an effect of fleetness through the application of so-called streamlines to body details and accessories. These efforts can be effective only to a limited degree because the designer's problem is essentially one of mass. Failing to solve the problem of mass, he may fall back upon the use of streamline details, colors and accessories, but these are of secondary importance. If the mass is correctly designed, there is no need of dependency on excrescences for effect. Accessories should be incorporated in the mass, and to the degree that the problem of mass is solved, the accessories will fall in place naturally without strained effect. Some designers have used two or three colors in contrast to break up the mass; indeed, such treatment is quite common, to give the effect of lightness, but again this

device is not sufficiently basic to alter radically the static quality of the design.

Rotation of design, and by that we mean the periodic change in shape of lamps, type of wheels, location of accessories and the like, offers little, if anything, to the fundamental advancement of design. Out of such juggling comes some forward movement, but rotation would not be necessary if the mass were well handled. Rotation, as the word would imply, is simply going around in circles. Dependence on it only retards advancement in design and produces a deadening similarity of products. The present-day motor car offers excellent opportunity for originality in body design, standardized as it is. Should the front-wheel drive car become popular, it may well open up new avenues of approach to the ideal, functional type of design.

If we examine the design of passenger cars now being offered to the public, we find those features which meet with lasting approval to be functional, although often they may have been, and probably were, developed more or less unconsciously. Evidence of this progress in functional design is found in the very compactness and unification of the present-day motor car.

It is, of course, easier to obtain the effect of unified mass in the roadster type of body than in the closed models, as the peak of the mass comes sufficiently far forward to give the effect of a tail in the back when the rumble seat is closed. The tail effect adds much to the good proportion of the mass. The limousine or sedan type of body, where the peak of the mass ends abruptly in the back, is helped greatly by a spare tire and trunk which, in a manner, affords a tail effect. Many coupes accomplish a nice transition of the high part of the mass to the ground in back by means of a top brace and a nicely curved rumble. Hogarth in his "The Analysis of Beauty" calls the compound "S" curve a line of beauty, and designers who have felt the abruptness of bodies terminating vertically in the back have

applied it quite successfully in the use of the top brace to soften the abruptness and carry the eye down to the rumble in a graceful line.

The use of a curved plane to the front of the forward pillar, while graceful in itself as applied to a stationary object, when applied to a moving one seemingly obstructs its speed and so violates functional design. Again, the placing of spare wheels in forward fender wells, a common practice, interrupts the flow of lines which suggest speed. Frequently the spare wheels might better be carried in the back, thus giving a tapering appearance to the mass, which adds to the effect of fleetness.

Saoutchik has added to the fleetness of appearance of the Mercedes-Benz design by terminating the body in the rear with a harmonious curve. An American attempt at the same effect is found in the Chrysler Imperial phaeton.

Several limousines are being offered which, though luxurious, still adhere firmly to the old coach traditions. In at least one case there has been an attempt to obviate the stiffness of the perpendicular lines by the use of a sloping windshield, but this does not offset the abnormally high roof and the abrupt termination of the rear. Use of the "S" top brace is more necessary on these formal closed models than anywhere else. Streamlines combined with color contrasts to break up mass have been quite successfully worked out, notably by Auburn.

Newness of design has not been successful in itself as a means of capturing universal public favor. Every year, at least one manufacturer has attempted to cut a swath only to find that his product has failed to "take" with the public. Such failures are numerous enough to afford an object lesson of considerable value, and from them we may conclude that they arise from two primary causes: Either the product seriously violates the functional in its design, or, and rarely, it features a sound design too advanced for the public taste.

Automotive Bills Introduced At Mass Production Rate

(Continued from page 470)

obtain a license within three months on written application, but without examination. Thereafter, every new driver must first obtain a temporary instruction permit, good for a limited period when accompanied by a licensed operator and then, within 60 days, fill out an application for a license and pass the examination, which includes a brief oral test on the rules of the road and a demonstration of driving ability.

One of the reasons advanced in the industry for opposing any further examination of new drivers than required by the "Uniform Motor Vehicle Operators' and Chauffeurs' License Act" is that long delays in obtaining licenses would be entailed because of a lack of enough examiners to conduct lengthy examinations promptly. Such delays are being experienced now in states where comparatively simple systems are in force.

A movement to prohibit the use of solid rubber tires on any kind of motor vehicle is making itself felt. It has been prompted partly by the highway damage attributed to the heavy impact of solid tires, and partly by the pressing demand for speed and easier riding qualities exerted by the phenomenal increase in long-distance hauling. Proposed legislation on the subject is assuming two forms, one would tax them off the highways and the other would eliminate them by outright prohibition of their use.

Operating along similar lines has been a tendency toward reducing the gross weight a vehicle is allowed to carry on the highways, with the larger allowance for

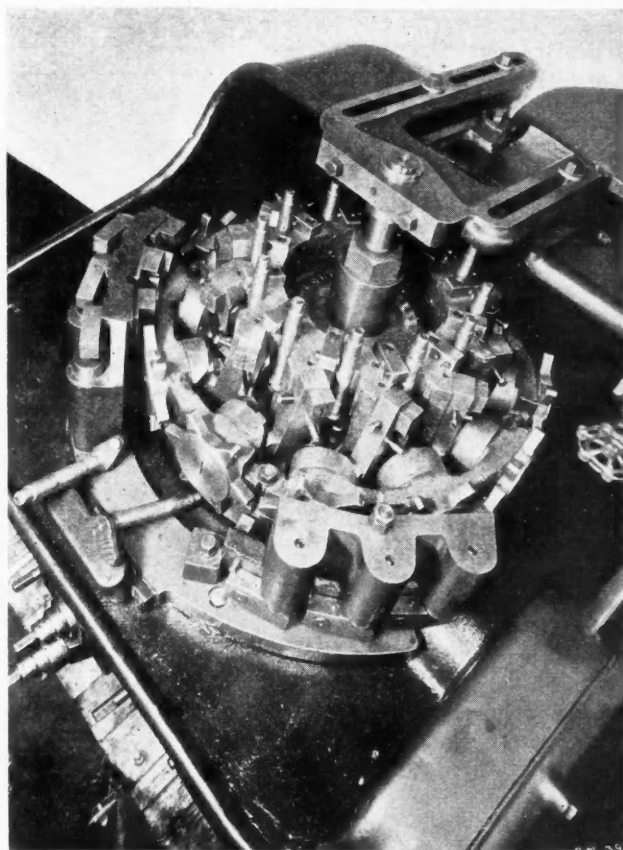
six-wheel units bringing them into use in greater numbers.

Legislative subjects relating to trucks and buses as common carriers have remained passive this year, apparently awaiting the outcome of the consideration by Congress of the last bill introduced in the House of Representatives by Representative Parker of New York to provide for the regulation of such traffic by the Interstate Commerce Commission. Briefly, the proposed measure is intended to have that body regulate every common carrier providing scheduled service to the public through requiring a Federal certificate permitting its activities before it can operate. Regulation of vehicle sizes, rates, speeds, taxation and traffic would remain within the executive scope of each state.

The present bill under discussion is the fifth of its kind that has been introduced in Congress in the last four years, and is the third introduced by Representative Parker. He broached a similar bill more than a year ago. It was brought up last fall, and last December he introduced a new bill amending the previous one. The proposed measure has been endorsed by bus interests as well as railway and street car representatives.

What will be the outstanding automotive legislation of the year cannot be determined until probably next fall, when a compilation of measures enacted has been completed. It will be remembered that the preeminent legislation concerning the industry in 1928 was the repeal of the Federal war excise tax on automobiles.

Offset Miller Used for *Finishing* *Steering Gear* Lever Bosses



A view showing equipment for the milling of the bosses on the steering gear lever

A VERY interesting production job is being performed in one automobile factory in which the bosses of the steering gear lever, shown in the accompanying sketch, are being finished at the rate of 520 pieces per hour.

The material is a steel forging and, as shown, the lever shaft is $6\frac{3}{4}$ in. long, $1\frac{1}{4}$ in. diameter, with the lever arm extending 2 in. from the center of the shaft to the center of the bosses which are to be machined. One boss is machined for a distance of $1\frac{3}{4}$ in. while the other is machined $\frac{3}{4}$ in.

The machine used is a 48-in. Oesterlein Tilted Offset Miller equipped with a fixture having 12 work-holding units. The units work automatically with the operation of the table to clamp the pieces in position by means of the star wheels, shown in the illustration, catching the locking plungers which cause the star wheels to rotate, thus operating the clamping lever.

The parts are mounted on the outer periphery of the fixture body with the lever arm extending inside and resting against a fixed stop which takes the pressure of the cut. Spring plungers hold the work against the fixed stop.

With the offset milling method, the two half side

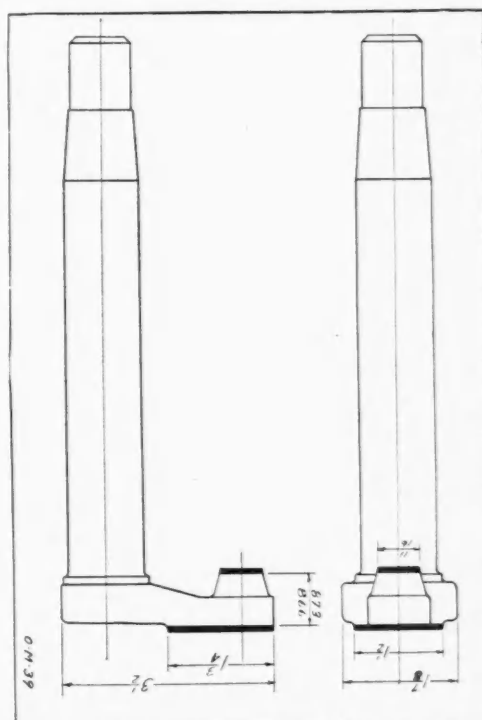
Pieces are turned out at the rate of 520 an hour from the twelve work-holding devices on the fixture.

The units automatically clamp pieces in position.

milling cutters used—of 10 and 12 in. diameter for the two bosses—rotate in a counter-clockwise direction while the work rotates in a clockwise direction. The cutter spindle is offset from the work-carrying fixture the depth of the maximum cut required. This arrangement makes it possible to have 90 deg. of the circular cutters at work simultaneously, which is said not only to increase cutter life but to result in very fine finish.

As shown in the illustration, a large central cutter is offset to the work-carrying fixture revolving in the opposite direction about it which makes the parts move in an elliptical path against the cutter teeth. As the finished parts clear the cutter, they may be unloaded by hand so that nearly half the fixture is available for unclamping, unloading and loading. Despite this fact, however, automatic clamping and unclamping mechanisms are usually to be desired because of the rapidity with which parts may be finished as a result of each one sharing the feed of all others under the cut at the same time.

Working drawing of steering gear lever, the lever arm bosses of which are finished in an Oesterlein tilted offset mill



High-Speed Type Diesel Engine Progress Shown at Meeting

Future research should consider coordination between fuel pump characteristics and combustion requirements, engineer tells Penna. Section of S.A.E.

IN his talk on Diesel Engines before the Pennsylvania Section of the S.A.E. on March 13, D. W. R. Morgan, manager of the internal combustion engine department of the Westinghouse Electric & Manufacturing Co., said he appreciated the willingness of companies engaged in this development to give out information that was calculated to help in the advancement of the art. Those who are now manufacturing high-speed Diesel engines were deeply indebted to the men who during the past few years had been willing to tell what they knew on the subject.

Mr. Morgan said it was generally recognized that to widen the field for the Diesel engine, its weight and bulk would have to be reduced, and what progress had been made along these lines had been due mainly to an increase in crankshaft speed and to improvements in the metallurgical products used in the manufacture of the engines. As indicative of steps in the progress toward lower specific weights, he showed wooden models of a Burmeister & Wain marine four-cycle engine of 1340 hp. which weighed 321 lb. p. hp.; of a Sulzer Brothers two-cycle engine of the same output, which weighed 281 lb. p. hp.; of a 900 hp. submarine engine which weighed 53.6 lb. p. hp. and of engines of 1340 hp. installed in a locomotive in service in Canada, which run at a crankshaft speed of 800 r.p.m., and which are of much smaller size than any of the others. This latest engine will go into the standard locomotive cab and leave sufficient room for repair parts, etc.

Interesting 12-Cylinder Type

Mr. Morgan gave an outline of the different types of engines which were developed by his company in the course of its long activity in the internal combustion engine field. One of the most interesting of these was a twelve-cylinder opposed piston type with the cylinders arranged in horizontal banks three high, the four banks forming the sides of a square, with four vertical crankshafts at the corners. An electric generator was mounted on top of this engine structure and driven from the crankshafts through gears.

Later the company became interested in the development work done on Diesel engines by Wm. Beardmore & Co., Ltd., of England. This work was carried on with the cooperation of the British Government, the original purpose being to develop an oil engine for aircraft. Later on the experience gained was turned to use in building engines of moderate weight for rail transportation, and Mr. Morgan expressed the opinion that the Beardmore firm probably had done as much in the development of high-speed Diesels as any firm in the world.

The development of the Beardmore engine in England was outlined, and the speaker then gave an account of

work done by his own firm in the development of a 300-hp. engine for switching locomotive work, under the Beardmore system. The engine has six $8\frac{1}{4}$ by 12 in. cylinders and operates at a governed speed of 800 r.p.m. It is of the solid injection type, the fuel pump and governor being located at the forward end. In the original design a triple pump was used, comprising three pressure plungers, three control plungers and three switching plungers, the latter being necessary because each pump cylinder had to supply two engine cylinders and was connected alternately to each by means of the switching plunger or switching valve. By means of the pump a pressure of 8000 lb. p. sq. in. can be put on the oil, but such high pressures are not utilized, the injection nozzles being set to open at a pressure of 1800 lb. p. sq. in. These nozzles are of the usual type, in which a conical valve is held to its seat by a spring and is lifted by the differential pressure of the oil on it. The nozzle has eight orifices at the delivery end, with a diameter of 0.013 in. each. Mr. Morgan said there was no reason to become alarmed at the small size of the orifices lest they should become choked by impurities in the oil, as it was an easy matter to strain the oil to take out all solid particles of a size that could obstruct such a passage.

Regulating Engine Speed

If the speed of an engine is to be regulated between limits of, say, 300 and 800 r.p.m., something more than the ordinary flyball governor is required, and the engine in question is fitted with a combination flyball and hydraulic governor, the latter part being controlled from the engine lubricating system through the intermediary of a number of hydraulic relays. The oil pressure in the lubricating system increases with the speed of the engine. This pressure, acting through the relays, is used to compress the governor spring and thus cause the governor to reduce the fuel spray. To do this, the governor must act on the valves of the pump, and Mr. Morgan said that if the flyball governor was depended on to do this alone throughout the speed range, it would have to be made very large. The governor "times" the pump, so that at low speed injection begins later during the cycle, thus preventing "pinging."

Lately a new simpler oil pump has been designed, which has only six plungers instead of nine. Switch plungers have been done away with, there being now one pump cylinder for each working cylinder, and the plunger in this pump cylinder performs the functions of both the pressure plunger and the control plunger in the previous design. To this end the plunger is formed with a helical cut-off edge and is rotated in its barrel by means of the governor. One of the things discovered in experimenting with this engine is that all of the fuel

lines to the different atomizers must be of exactly the same length and size, if the load is to be evenly divided between the cylinders.

The crankcase of the engine is a steel casting with walls $\frac{3}{8}$ in. thick. This is about twice as thick as required for strength, but if the walls were made thinner, trouble would be experienced in the foundry. This casting, moreover, comprises both the cylinders and the crankcase, but the cylinder liners are separate. All crankshaft main bearings are carried by the crankcase, instead of on the bed-plate as in marine practice.

Turning to troubles encountered in the development of this engine, Mr. Morgan said there had been trouble with the valve gear, which upon investigation was found to be due to inadequate lubrication. The valves are located in the cylinder head, and their operating mechanism comprises pushrods with spherical joints. By supplying oil under pressure to these joints this trouble was overcome. There had been some trouble also from improper clearances in the valve gear. Shims were eliminated as means of adjusting the clearance, and set screws were used.

Trouble With Bearings

Big end bearings of connecting rods had given some trouble, and the steel shells originally used for the bushings had been replaced by bronze shells in the first place, the result being that if the babbitt in one of the bearings melted out, less damage was done to the shaft by the material of the backing coming in contact with it. There was some trouble from cracking of the babbitt. At present the babbitt was applied to the connecting rod directly, and the bearing pressure was decreased, which practically eliminated this trouble. In the original design there was an oil groove around the bearing, which divided the effective bearing area in halves. This groove had been eliminated.

Some trouble was caused also by fuel pump leakage, and this was overcome by the use of more suitable materials. Of course, if the pump was to give continued satisfactory service, the fuel must not contain grit which would cut the bearing surfaces, and it must not have an unduly high sulphur content. In the latest design of pump, in which there is one pump cylinder for each engine cylinder, the pump speed has been reduced to half engine speed, which tends to give more reliable service.

As regards lubricating oil consumption, Mr. Morgan said he had found that changes in such factors as the jacket water temperature and the pressure on the lubrication oil accounted for variations in oil consumption of from one-half pound to 8 lb. per hour. Engineers often consoled themselves with the thought that if the oil circulated rapidly, the heat would be carried off from the bearings more readily, but there was one most economical rate of circulation from the standpoint of both heat transfer and lubrication, and this should be determined.

Much was still to be learned in the field of high-speed Diesels; in the future research

should be carried on along lines of greater coordination between fuel pump characteristics and combustion requirements. "You cannot separate the pump from the atomizer," concluded Mr. Morgan.

An interesting part of the paper by E. A. Canning, of the F. B. Stearns Laboratories, was the display of slow moving pictures of the valve action of an experimental Diesel engine, and of the spray from an injection nozzle. Trouble had been experienced with the poppet valves, and it was decided to investigate this with the aid of the vibroscope. It was found that the valve springs were not strong enough to keep the valve down to the cam, and the regular lift was followed by a number of oscillations, causing the valve to open when it should be closed. With the regular spring the effect was not sufficiently pronounced to make it clearly discernible, and so for the moving pictures a special spring of less strength than the regular one was used. It was found impossible to obtain high-speed photographic records of the spray into the cylinder under compression, and the spray pictures shown were of a spray into a chamber at atmospheric pressure.

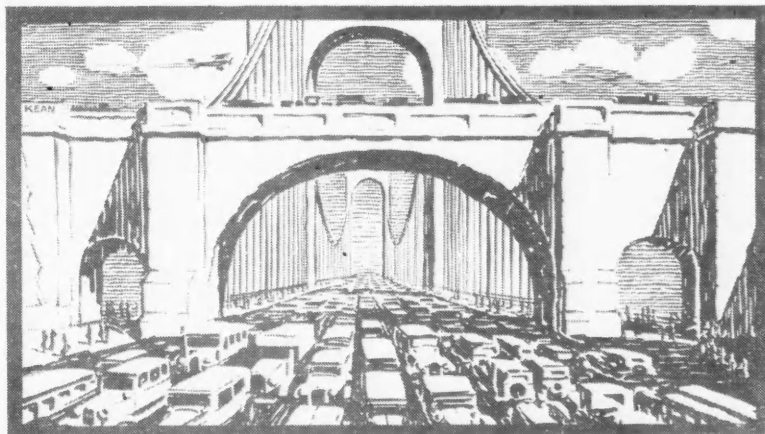
Mr. Canning outlined the advantages of the two-stroke cycle engine, pointing out that if the same mean effective pressure could be obtained, such an engine would produce twice as much power as a four-stroke cycle engine of equal displacement running at the same speed. However, most of the two-stroke Diesel engines produced in the past had shown mean effective pressures not exceeding about 55 lb. p. sq. in., whereas 90 lb. p. sq. in. was obtained with the four-stroke engine. To get higher mean effective pressures more effective scavenging was required, and Mr. Canning displayed a graph showing the relation between the relative amount of scavenging air used and the amount of fuel which could be burned. This showed that when the scavenging air used was equal to the displacement of the cylinder, only about 50 per cent as much fuel could be burned as corresponded to the displacement volume of air at atmospheric pressure and with twice this amount of scavenging air, the amount of fuel burned was as yet only about 85 per cent.

Heat Stresses High

In experiments to increase the amount of scavenging air supplied to the engine, various types of scavenging pump were tried, including a Roots blower type developed by the Navy. This had a rotor of forged magnesium, and one of the peculiarities of magnesium was strikingly brought home to the laboratory staff one day when the rotor was mounted in a milling machine and some work was being done on it with a grinding attachment. In an instant the whole milling machine was on fire (which

refers, presumably, to magnesium chips and oil with which the machine was covered).

With a two-stroke engine with effective scavenging, owing to the rapid succession of power strokes, the heat stresses on the pistons are very great, and Mr. Canning displayed photos of a cast iron piston in which the head center was cracked.



THE FORUM

Instantaneous Pressures May be Measured by Radio

Norman J. Thompson suggests new methods of transferring maximum pressures to actual record. Apparatus described.

Editor, AUTOMOTIVE INDUSTRIES:

The article dealing with progress in measurement of maximum cylinder pressures in the Feb. 9 number of *Automotive Industries* has served to stimulate some thought in connection with my work on properties of flammable vapors. After studying the problem, it seems that the solution presented below may have interesting possibilities:

There is apparently no feasible method of transferring maximum pressures to an actual record, except through the medium of mechanical movement. If the entire measuring process is done mechanically, there will be large inertia forces which will seriously interfere with the accuracy of results. In the electric balanced pressure indicator recently described, the lag of indication has been greatly reduced. We would like to carry the refinement even further and at the same time make available an apparatus which will give a continuous record of pressures throughout an explosion, or a complete engine cycle.

If inertia is to be practically eliminated, a diaphragm or disk to actuate the recording mechanism must, of course, be of large area with respect to its weight. However, the diaphragm must be strong enough to resist the maximum explosion pressures without danger of rupture. Consequently, in order to op-

erate under the most favorable conditions, the problem is essentially one of measuring extremely small movement. This can best be done by making the diaphragm one plate of a small condenser which will control the frequency to which an electric oscillator is tuned.

A suggested arrangement of apparatus is shown in the accompanying sketches; Fig. 1 suggests an arrangement for a diaphragm in the combustion chamber wall; in Fig. 2 is illustrated diagrammatically a twin oscillator, normally tuned to the same frequency; in Fig. 3 is given an economical and efficient arrangement for a low frequency amplifier.

The system would operate in the following manner: With no pressure on the diaphragm unit, the two oscillators are tuned to the same high frequency. Consequently, no beat-note or heterodyne is built up. If the diaphragm is moved ever so slightly by pressure exerted within the combustion chamber, the electrical capacity between the diaphragm and the fixed plate of the unit is increased. Since the capacity of the control unit is connected electrically in parallel with the condenser controlling one of the oscillators, this oscillator will be tuned to a new and higher frequency. There will result a heterodyne, the frequency of which will be the difference in frequency between the two oscillators. This beat-frequency, being of low order, will be passed on to the amplifier, where it will be increased in intensity but un-

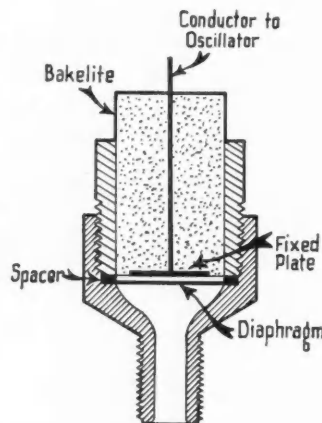


FIG. 1

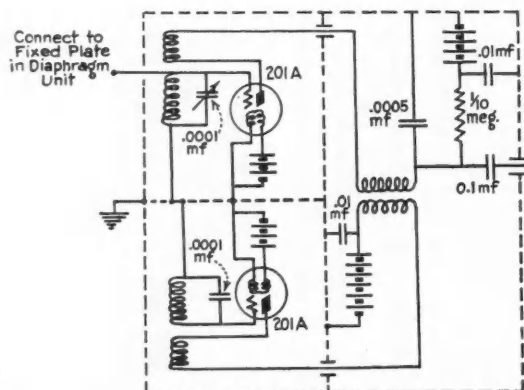


FIG. 2

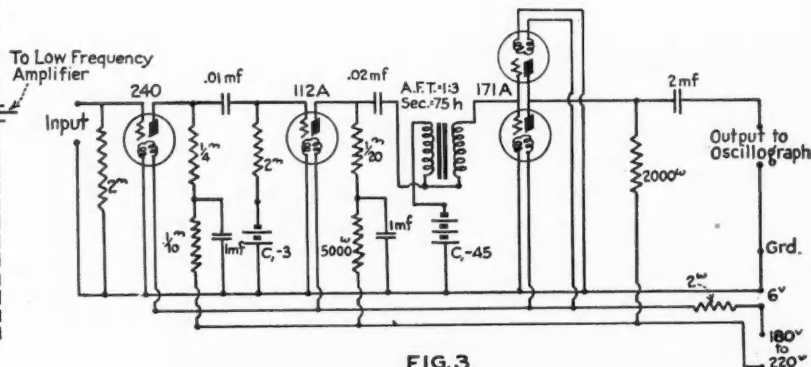


FIG. 3

changed as to frequency. If the output of the amplifier is connected to feed into a recording oscillograph, a record can be obtained which will show the difference in frequency between the oscillators in cycles per second. The greater the deflection of the diaphragm the higher will be the frequency recorded at the oscillograph. Consequently, with the engine hot, static calibrations can be made which will give data showing the exact relation between pressure in the cylinder and frequency at the oscillograph.

The diaphragm unit must be constructed to avoid undesirable capacity changes whether by vibration or thermal expansion. Accordingly all parts must be rigidly supported and calibrations made on a hot engine. In the unit illustrated, provision is made to change at will, the distance between the diaphragm and the stationary plate, or to use diaphragms of lesser or greater strength. A fairly rigid diaphragm can be used because a carefully constructed oscillator is capable of detecting movements of less than one millionth of an inch. Of course to attain such accuracy, every care should be taken to avoid undesirable capacity changes, and therefore the lead from the fixed plate to the oscillator should be of small diameter wire, and the position of this wire with respect to any metal objects should not be allowed to change.

A and B Batteries Enclosed Within Shields

The twin oscillator may follow the arrangement suggested in Fig. 2, or other well-known circuits may be used with equal success. The most important consideration is the individual shielding of the units. These shields should be of copper or aluminum, not less than 1/16 of an inch in thickness, rigidly made and assembled. The A and B batteries for each oscillator should be preferably separate and enclosed within the shields. The entire oscillator unit should be mounted close to the engine, but should be placed on a cushion support, so as to be free from engine vibration. All conductors in the oscillator should be as short as possible, and of heavy wire for maximum rigidity. Where conductors pass through the shields, they should be solidly bushed, so as to prevent capacity changes.

The connection between the fixed plate of the diaphragm unit and the grid of the control oscillator should be of small wire, No. 24 gage for example. It should be kept as far away from other metal as possible, and should be well supported to prevent any material changes in capacity between this wire and any grounded metal. The electrical return is made by grounding the combustion chamber wall and the oscillator shielding. It is suggested that the oscillator coils be chosen to tune to frequencies from 1500 to 2000 kilocycles. After the equipment is complete, the effect of a small movement of the diaphragm can be ascertained with the diaphragm outside of the cylinder wall by bending it and noting the pitch of the tone emitted from the amplifier when coupled to an audio reproducer. In order to obtain an accurate

record on commercially available recording oscillographs, the diaphragm should be so chosen that its movement on maximum instantaneous pressures will correspond to frequency differences in the oscillators not greater than 5000 per second, and preferably below 2500.

The amplifier shown in Fig. 3 will give an overall amplification well above 1000 for all frequencies between 25 and 5000 cycles per second. It can be readily constructed, using parts generally available. The audio-frequency transformer used to couple the second and third stages can be any modern high-grade transformer, having a secondary inductance of from 65 to 100 henries. This amplifier can be operated from a good commercial B voltage unit, without oscillation or "motor-boating." It will give a substantially undistorted output up to 1.3 watts, and this output can be increased to about 2.5 watts before harmonic or other distortion will seriously interfere with the interpretation of results.

There is nothing new in the principles or devices suggested to carry out this scheme of pressure measurement. However, the combination of a diaphragm-controlled oscillator feeding through a low frequency amplifier to an oscillograph may be novel and may appeal to research engineers who desire to obtain an accurate graphic record of pressure conditions.

NORMAN J. THOMPSON

Assoc. Factory Mutual Fire Insurance Co's.

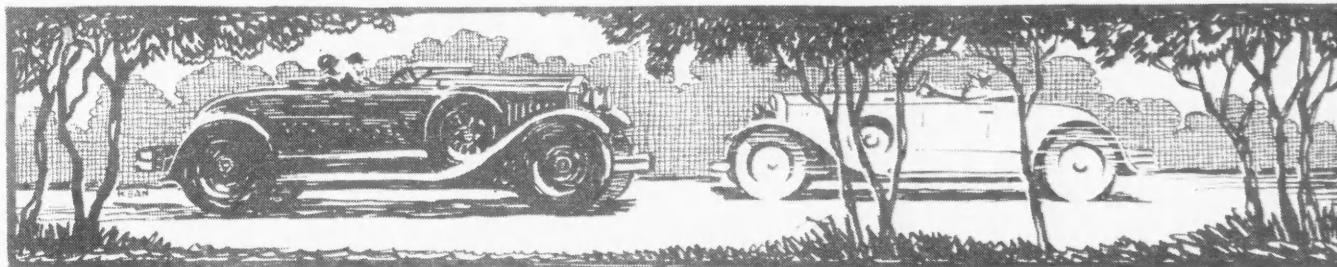
Gum in Gasoline

Editor, AUTOMOTIVE INDUSTRIES:

In your magazine for January 26, 1929, page 124, covering a part of the S.A.E. annual meeting paper which was prepared by Dr. Voorhees and myself and dealing with gum in gasoline, considerable injustice has been done to all the oil companies. The title as given in your magazine "Use of Cracked Gasoline Causes Valves to Stick," is entirely unjustified and the statement is very misleading. The Standard Oil Company of Indiana, as well as numerous other refineries, has been making for quite a number of years gasoline which contains a considerable portion of cracked products. These fuels are made by *liquid phase* cracking and, as they are marketed, do not and will not cause gum trouble in the automobile engine. However, if as is pointed out in our paper, it is desired to make better anti-knock fuels, then *vapor phase* cracking will probably be used and, unless properly provided for, these fuels *may* give trouble from valve sticking.

Furthermore, there is a statement made about gasoline gum troubles occurring from the very beginning of the automobile history which is known to be contrary to facts. Fuels made in the early days of the automobile were straight run distillates which were ordinarily exceedingly stable and would not cause any gum troubles.

J. O. EISINGER



Fairchild Using Genet Engine in Low Wing Monoplane

Light, 5-cylinder radial air-cooled powerplant is to go into production of 100 per month. Has compression ratio of 5.2 to 1. Uses .55 lb. of fuel per hp.-hr.

AS announced in the news columns of *Automotive Industries* some time ago, the Fairchild Airplane Manufacturing Company of Farmingdale, N. Y., has acquired from Armstrong-Siddeley, Ltd., the American rights to the Genet engine, a small radial air-cooled engine which abroad has been used to power particularly the well-known Moth small plane. It has a British rating of 80 hp. and is said to be the lightest engine of its size in the world. Quantity production of the engine is contemplated by the Fairchild company, and a production of 100 engines per month is expected to be reached by July. The engine will be used primarily to power the Fairchild "21," a two-place open cockpit low wing monoplane designed for sport use and for the training of student aviators. The Fairchild "21" is now in volume production at Farmingdale for the domestic market and for export to Latin American countries. The Canadian and Australian markets will be supplied by the Canadian Fairchild Company, whose planes are being equipped with Genet engines manufactured in the Ottawa plant of Armstrong-Siddeley, Ltd.

The Armstrong-Siddeley "Genet" is a conventional 5-cylinder radial air-cooled engine rated at 80 hp. at 2200 r.p.m. It has passed its 100-hour British Air

Ministry Type Test at the above normal rating, with a maximum rating of 88 hp. at 2400 r.p.m. One hour of this test is run at 2550 r.p.m.

The engine has a compression ratio of 5.2 to 1, and a displacement of 251 cu. in. The guaranteed specific fuel consumption is 0.55 lb. per hp.-hr. and the guaranteed oil consumption, 0.025 lb. per hp.-hr. The engine has a bore and stroke of 4 by 4 in. and weighs 215 lb.

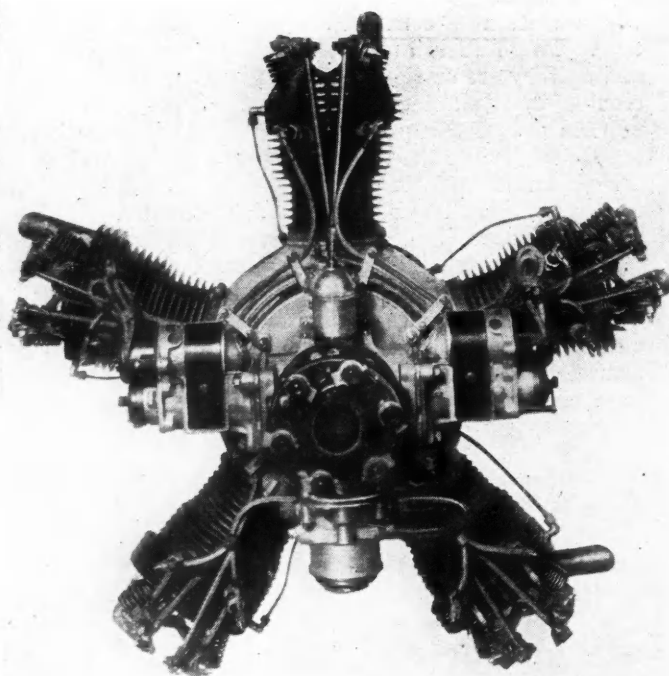
The cylinder assembly consists of a steel finned barrel with shrunk and screwed-on cast aluminum head. The seal between the head and barrel is assured by a patented beveled lock nut which transforms the expansion of the aluminum head when heated into increased pressure against the steel barrel, making the original shrink fit even tighter. The cylinder assembly is positively secured to the crankcase by a threaded steel sleeve which permits accurate adjustment of the compression ratio of the engines and eliminates the possibility of cylinder stud failures.

The crankcase is made in three parts which are simple, heat-treated aluminum-alloy castings. The body of the crankcase carries the cylinders and valve tappet assemblies. The nose casting carries two flange-mounted magnetos and a double geared oil pump, all of which are driven through bevel gears from the crankshaft. The rear casting forms the induction blower casing and supports the carburetor and engine starter. The mixture from the carburetor passes through an oil jacketed intake heater into the shaft-speed rotary fan, the function of which is to insure equal distribution of the mixture to all cylinders at all speeds.

The valve gear is of open push rod type, operating from a double cam ring at the front of the cylinders. Rocker arms are of ball bearing construction. Valves are of cobalt-chrome steel and set on stainless steel seats which permit the use of Ethyl fuel if desired. Valve springs are double, made of bright-finish music wire. It is recommended that the engine be operated with 20 per cent benzol or Ethyl fuel as being best suited to all climates. However, the engine will operate satisfactorily on standard aviation gasoline under normal conditions.

The engine employs a one-piece crankshaft made from a chrome-nickel steel drop forging, highly finished all over to insure thorough inspection for minute material defects. The shaft is counterbalanced with bronze counterweights, and is both statically and dynamically balanced in manufacture.

The master rod is of two-piece construction



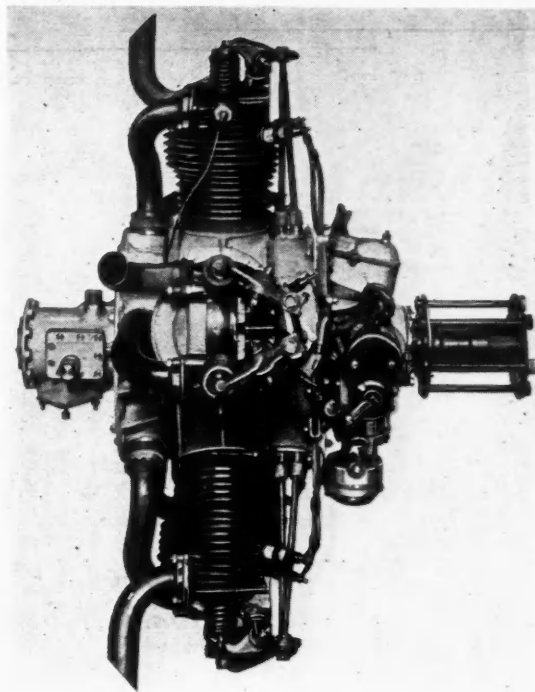
Front view of Genet engine

and employs a steel-back babbitt-lined crankpin bushing. The link rods and master rod are of H section and are made from drop forgings, heat-treated and pickled in process, and highly finished all over for the detection of material defects. Piston pin and link rod bushings are of the floating type.

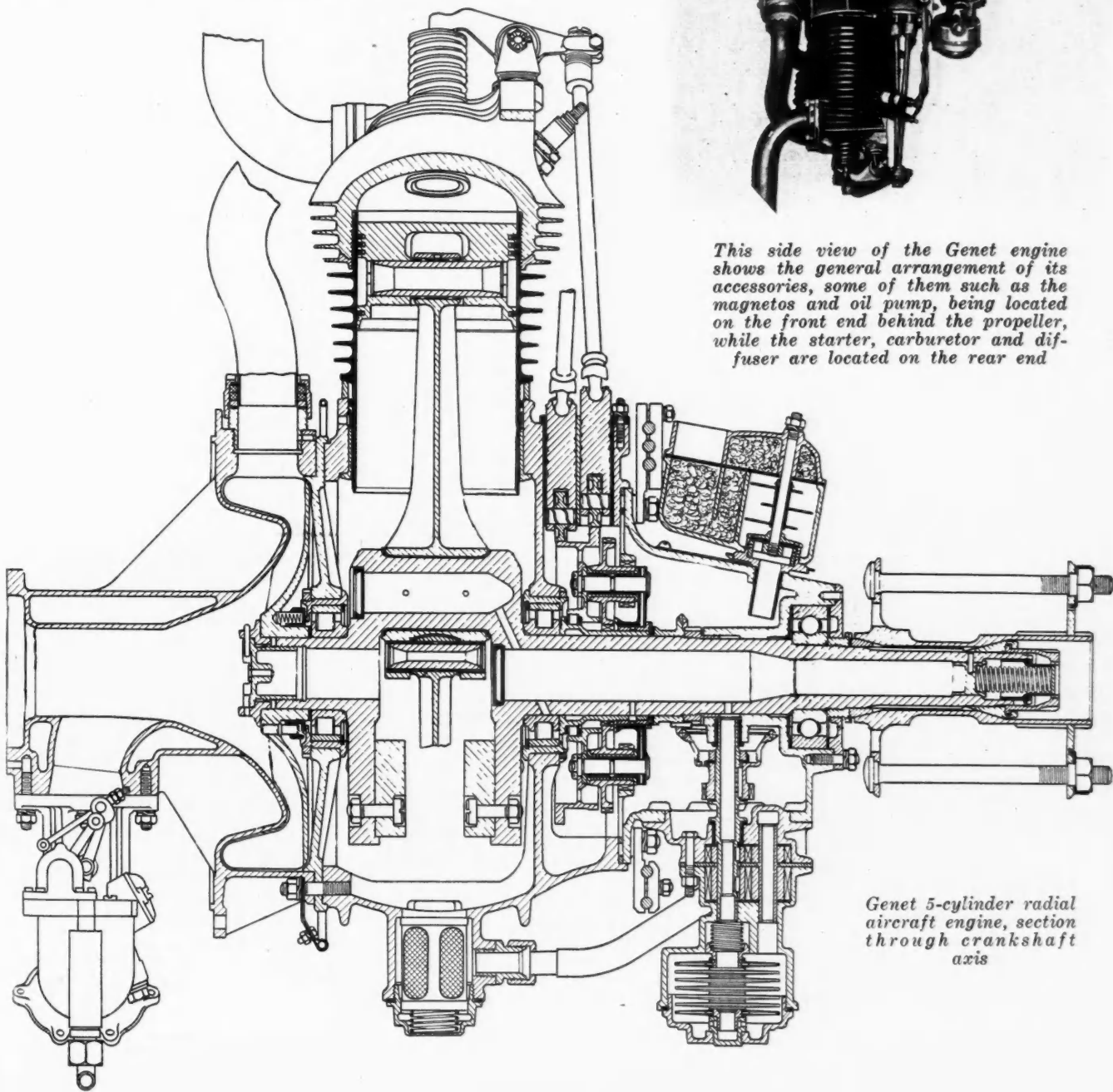
Pistons are made of forged Y-alloy, finished all over and carefully balanced. Each piston employs two plain compression rings and two oil scraper rings, one above and one below the piston pin. Ignition is by two spark plugs in each cylinder, connected to two flange-mounted magnetos. One of these magnetos is fitted with an impulse coupling which facilitates the starting of the engine.

The oil pump is of the double geared type, consisting of a scavenging pump of large capacity which draws the oil from the bottom of the crankcase through a strainer and delivers it to the intake heater, from where it passes to the oil tank. The pressure pump receives the oil from the tank and passes it through a second filter which is easily removable for cleaning. From there the oil passes into

the hollow crankshaft, through which it is distributed to all the bearings and cylinder walls. The crankshaft is supported by two Hoffmann roller bearings with an auxiliary deep-groove ball bearing at the front end of the case which takes the propeller thrust.



This side view of the Genet engine shows the general arrangement of its accessories, some of them such as the magnetos and oil pump, being located on the front end behind the propeller, while the starter, carburetor and diffuser are located on the rear end



Genet 5-cylinder radial aircraft engine, section through crankshaft axis



A fleet of Kuka refuse trucks in the service of the city of Potsdam

Germans Develop Sanitary Refuse Trucks

*Special Krupp model makes use of screw conveyor for loading.
Cylindrical bodies are feature of another type.*

SEVERAL different types of trucks with special bodies for the removal of ashes and house refuse have been developed in Germany in recent years, with the objects of facilitating the loading and unloading of such trucks and preventing the spilling of the refuse in loading. The chief advantage of these trucks undoubtedly is that they prevent ashes and other light material being blown about while the trucks are being loaded, to the annoyance of the loading crew, people in the street, and residents, and they represent a great improvement over old equipment from a sanitary standpoint. For the completely-dustless removal of house refuse it is necessary to use standard containers, which, of course, makes the introduction of such systems of removal expensive. But a great improvement over the ordinary method of removing ashes in trucks with open bodies can be achieved even with miscellaneous containers, so that householders need not be put to the expense of buying the standardized "ash cans."

The system which has been in use longest appears to be that of the Krupp Company in Essen, which makes use of a screw conveyor for loading the truck body. This system, we

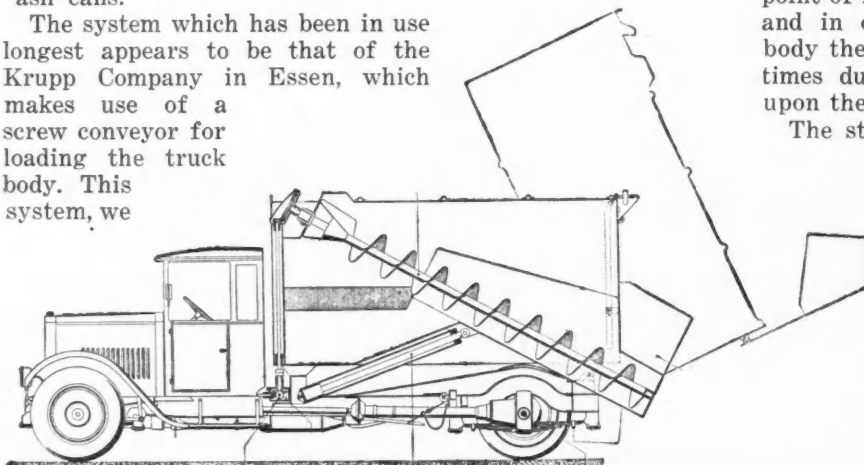
are informed, has been adopted by more than 80 cities so far. One type of Krupp refuse trucks is shown here.

As may be seen from Fig. 2, which is a sort of phantom view of the Krupp truck, a screw conveyor is arranged inside the body, running through it diagonally. The screw, which is made of a grade of steel having high resistance to wear, is driven from the truck transmission through a power take-off comprising two pairs of bevel gears. The housing for the screw, which is made of alloy steel plate a little over 3/16 in. thick, projects from the body at the rear, and its end, which is about 3 ft. from the ground, forms the opening through which the truck is loaded. It is obvious that the labor involved in loading such a truck, where the containers have to be lifted only to a height of 3 ft., is considerably less than where they have to be lifted over the sides of the conventional open ash truck, which is nearly 6 ft. high.

The screw conveyer moves the refuse from the point of loading to the forward part of the body, and in order to distribute it throughout the body the latter is tipped either once or several times during the loading operation, depending upon the nature of the load.

The standard capacity of these ash trucks is 12 cu. meters or 15.6 cu. yd., and it is claimed that the loading of a body of this capacity takes from 50 to 70 min., depending upon local conditions. A vehicle of this capacity can move from 60 to 78 cu. yd. of ashes and refuse per day, it is claimed.

With this truck, if standardized containers are used by the householders, which exactly fit the loading opening of the truck, ash removal is entirely dustless, as the body is then completely closed dur-



Sectional view of Krupp refuse truck, showing arrangement of screw conveyor

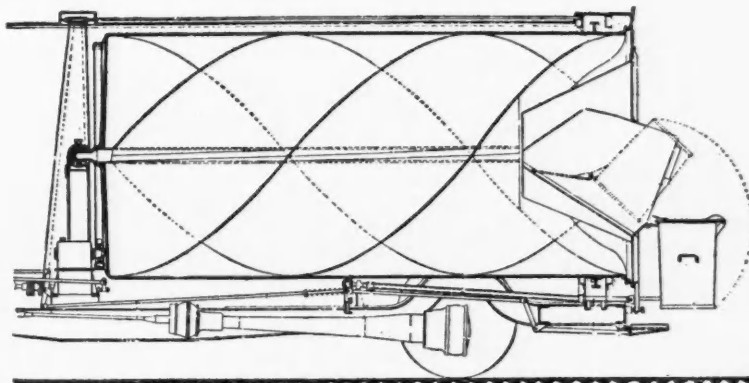
ing every phase of the loading operation. However, miscellaneous sizes of ash cans and even pails of from 12 to 16 gal. capacity can also be used with this truck, in which case the escape of dust is reduced by the use of a protecting curtain. Where comparatively small containers are the rule, the body is provided with two loading openings instead of a single one.

There is another type of ash-removal body in use in Germany, which is loaded from the side. The body is of cylindrical form, but has a number of depressions in its side, with openings against which the standard containers can be placed. To distribute the load in such a body the latter is rolled around its axis during the loading process, being mounted on rollers on the truck frame for the purpose.

The Krupp ash truck is unloaded by dumping the load out at the rear. The rear wall of the body forms a gate swinging around its top edge, and when the body is raised up at the front by means of the hydraulic tipping gear, the whole load is discharged practically instantly. While originally these ash removal bodies were mounted on the old-style, low-speed truck chassis, recently they have been mounted on speed-truck chassis fitted with six-cylinder 75 hp. engines and capable of speeds up to 25 m.p.h.

A quite different type of ash-removal body, which has the advantage that it requires no tipping either for loading or unloading, has been developed by Keller & Knappich of Augsburg. The body consists of a cylindrical steel drum which is supported on the chassis frame at three points. At the forward end it is supported by a ball stud mounted in a spherical bearing on a pedestal on the frame, while at the rear there is a rail running around its circumference which is mounted on rollers on the frame. Within this cylindrical body there are helical conveyer "shovels." At the rear the cylinder has a stationary head, which is provided with a central funnel projecting into the body and in the lower part of which is the opening through which the body is loaded. In the latter there is a hinged gate which opens when the ash cans are emptied into the body and closes automatically when the cans are removed.

During the loading and unloading operations the body is revolved around its axis by means of a power take-off. For loading it is turned right-handedly—looking in the direction of truck motion—and for unloading left-handedly, the speed of rotation being about three times as high while unloading as when loading. Engagement of the power take-off is effected by means of a lever located in the driver's cab, but the gear can be disengaged also, in case of an emergency, by means of a foot-lever located at the rear end of the truck. The body is protected on the outside with a sheet-metal covering



Sectional view of Kuka refuse truck body, which is revolved by engine power for loading and unloading

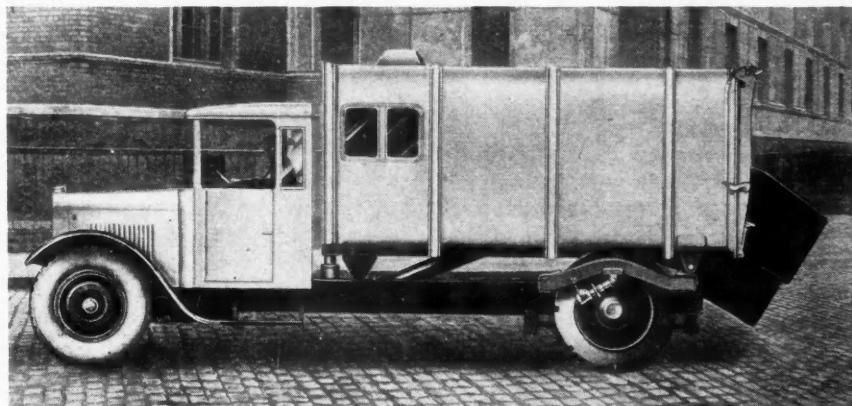
and has a packed joint with the stationary rear head. For unloading, the rear head, which is hinged at the top, can be opened by means of a crank, and the whole contents of the body are then discharged in about three minutes.

Uses for Beryllium Studied

A COMMITTEE of the (British) Department of Scientific and Industrial Research during the last year has given considerable attention to possible uses of beryllium, according to the annual report of the department.

At the time when the work at the National Physical Laboratory was begun, beryllium could not be obtained except in the form of an impure powder, and it was found necessary to develop methods of production at the National Physical Laboratory. These methods have been successful in providing beryllium metal in a high state of purity, and it is believed that the experience gained will be of considerable value if beryllium is ever manufactured on a large scale. It is extremely difficult, however, to produce the metal free from traces of oxide, and although chemical analysis indicates that the total amount of impurity present is small, there is ample evidence that it is sufficient to affect quite definitely the properties of the metal. For instance, the beryllium obtained at the Laboratory is brittle, and so far as is known no ductile specimens have not yet been prepared. There is no reason to believe that this is an essential property of beryllium; on the contrary, X-ray analysis of its crystal structure indicates that

it is likely to be ductile in the pure condition. Recent work has shown that metals such as zirconium and titanium, which were formerly believed to be brittle, are ductile when obtained in a state of sufficient purity. Beryllium is a much lighter metal than aluminum.

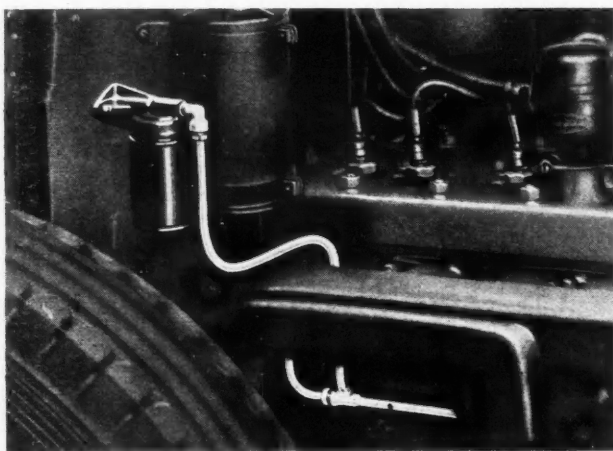


Krupp refuse truck with body of rectangular cross section

NEW DEVELOPMENTS—Automotive

Chrysler Decarbonizer

THE Chrysler Sales Corp. is marketing "Carbosolve," a fluid which dissolves carbon binder from cylinder heads, upper walls and piston heads, and the Decarbonizer equipment, which provides a convenient method for periodic use of Carbosolve. The equipment includes a fixture holding a small standard screw-top container



Decarbonizer unit attached to motor

in which 6 oz. of the Carbosolve fluid are contained. The fixture is connected to the inlet manifold and is controlled by a plunger on the back of the body dash under the cowl. When the plunger is pulled with the engine running at a fair speed and a normal driving temperature, the Carbosolve is drawn into the engine, thoroughly saturating the combustion chambers and the engine is stopped. After standing for several hours, the engine is again started and the loosened carbon particles will be blown out of the exhaust.

Rotational Accelerometer

AT the recent annual exhibition of the Physical and Optical Societies at the Imperial College of Science and Technology in South Kensington, London, the Cambridge Instrument Company exhibited an instrument designed to record changes of angular velocity in rotating members. It may be used also to detect torsional resonance and the effect of such resonance on the running of an engine or accessory apparatus. The following description of the device is taken from *The Engineer*.

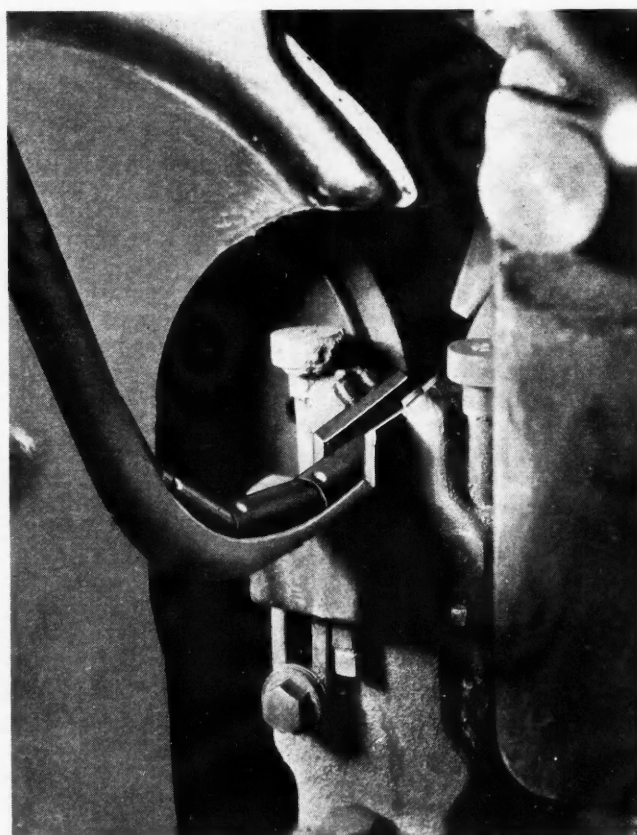
A wheel mounted on a horizontal spindle is driven by the engine under test by a form of belt which accurately transmits the instantaneous angular velocity. To the driven wheel is flexibly attached a heavy wheel, which is carried on the same spindle, but mounted entirely separately from the driven wheel. The peripheral speed of the heavy wheel quickly becomes steady and tends to remain so, while the peripheral speed of the driven wheel varies with that of the engine shaft. The difference in the angular positions of the two wheels is transmitted to a stylus by means of a novel form of flexible link which eliminates back-lash. The stylus is pressed

lightly into contact with a continuous strip of celluloid 12 mm. wide—which is moved by means of a clockwork mechanism at a speed which can be varied over wide limits. By these means a permanent and clearly defined record of the variations in the rotational velocity is traced in the celluloid surface. This method of recording, which does not depend upon optical or photographic methods, is said to be capable of great accuracy, even when recording rapidly changing accelerations.

Two electromagnetic marking mechanisms are fitted, so that a time scale, generally tenths of a second, can be marked on the film by one mechanism, while the revolutions of the engine can be recorded by the other mechanism. In each case this is done by means of a separate stylus operating on the back of the film, so that it is possible for the stylus making the record of accelerations to pass over the whole of its range without fouling either the time-marking or the revolution-recording stylus. The instrument can be set in operation and the film speed adjusted electrically from a distance.

Cadillac Wrist Pin Production

WRIST pins made by the Cadillac Motor Car Co. are of seamless steel tubing and, after passing through the various machining operations, must be

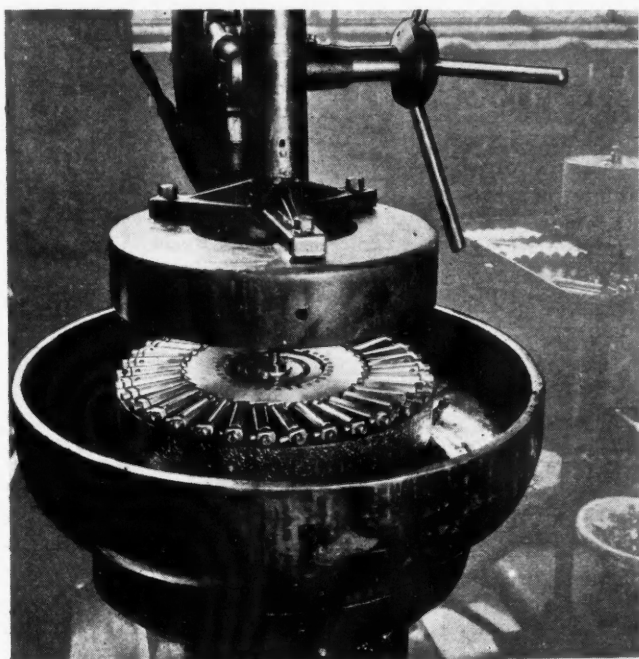


Centerless grinders equipped with automatic feeding devices are employed to rough grind the outside diameters of wrist pins to 0.001 in. tolerance and to finish grind them to 0.0002 in. tolerance

Parts, Accessories and Production Tools

within tolerances of 0.0001 in. for size and straightness and must be perfectly round in order to pass the very rigid inspection given them.

The first operation, which is performed in an automatic screw machine, is to cut the tubing to length and to form the ends of the pins. They are then washed, both ends are burred and the screw machine work is inspected.



Wrist pins are finished in this lapping machine which removes about 0.0001 in. of stock and leaves them accurate for size, roundness and straightness with no perceptible error

The outside diameter is rough ground in a centerless grinder in which the size must be held within tolerances of plus or minus 0.001 in. After this operation is inspected a special multi-spindle, two-way drilling machine is employed to drill, rough and finish ream the lock screw hole in the pin. Permitted tolerances in this hole are 0.001 for size and 0.004 in. for squareness with the outside diameter of the pin in the length of the wrist pin.

Holes are chamfered and burred in a drill press and after another inspection the pins are carburized and hardened, sand blasted and again inspected. Scale is cleaned from about the hole in the pin by means of a speed lathe after which the outside diameter is again rough ground in a centerless grinding machine holding to a tolerance of 0.001 in.

Directly following this operation a similar machine is employed to finish grind the outside diameter. Size tolerance for this operation is 0.0002 in., while the pin must be straight and round.

Corners are broken and polished in another speed lathe and the outside diameter is lapped in a lapping machine after which comes final inspection.

The lapping operation removes about 0.0001 in. of stock and leaves the pin accurate for size, roundness and straightness, with practically no perceptible error.

Lincoln Adopts Lord Motor Mountings

LINCOLN is now using Lord Rubber Mountings for its motors as standard equipment. The mounting is formed of a rubber bushing vulcanized to a central sleeve and an outer shell, as shown in Fig. 1. The mounting is arranged vertically, as shown in the assembly in Fig. 2, and is so designed that it can be readily installed in earlier Lincoln cars.

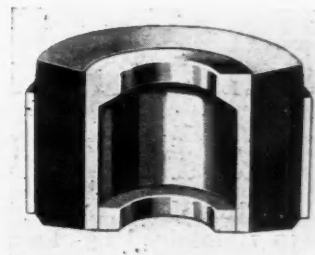


Fig. 1—The mounting is formed of a rubber bushing vulcanized to a central sleeve and an outer shell

The rubber of the mounting is under initial tension and carries the load with tension suspension which gives a maximum vibration absorption with a minimum of movement. The mountings have rubber extensions bottoming to limit the movement. The characteristic load curve of these mountings is very easy through the normal vibration range and very abrupt under overload.

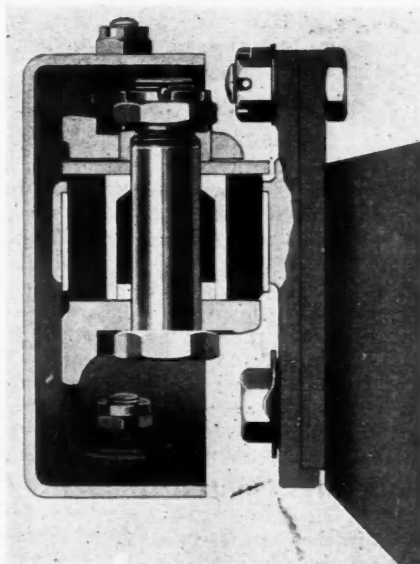


Fig. 2—The mounting is arranged vertically and is designed so that it can be installed readily in earlier Lincoln cars

This characteristic gives softness to absorb normal motor vibrations and stiffness for shocks, against which they are said to be exceptionally effective.

The mountings are made by the Lord Mfg. Co., of Erie, Pa. The bonding of the rubber to the metal is in accordance with the practice of that company in the manufacture of bonded rubber spring shackle joints.

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Reliable,
Accurate

News of the Industry

PAGE 494

VOLUME 60

Philadelphia, Saturday, March 23, 1929

NUMBER 12

Car Stocks Are Favorable as High Output Continues

PHILADELPHIA, March 23—High production schedules that have been maintained by the automobile factories during the past several weeks are reflected in increases in new car stocks among dealers throughout the country totaling approximately 200,000 units more than at this time a year ago. Stocks in dealers' hands are estimated to aggregate between 550,000 and 600,000. This sizable increase is the result of factories' preparations to meet a heavy demand anticipated for the spring and summer, and there is little indication that dealers' stocks are excessively heavy. Ford dealers carried practically no stocks a year ago and a large part of the increase is due to the heavy production of the Ford Motor Co.

Official Department of Commerce figures fix the total February production of cars and trucks in the United States at 466,084, establishing a new all-time record for a single month's output. This figure, including 407,589 passenger cars and 58,495 trucks, exceeds the former all-time record of August, 1928, when factories in this country turned out 400,593 cars and 60,705 trucks, by 4786 units. It compares with 400,715 cars and trucks in January and with 323,796 in February, 1928. Total production in both the United States and Canada last month was 497,371, compared with 422,216 in January and with 336,300 in February, 1928.

A number of facts available at this time indicate that sales this year will run considerably higher than in 1928. January sales were nearly 60 per cent above those of the same month a year ago, and early reports for February also indicate large gains.

Thermoid Buys Southern

TRENTON, N. J., March 20—Controlling interest in the Southern Asbestos Co., manufacturer of yarn and asbestos cloth, has been acquired by the Thermoid Co., formed by the merger of the Thermoid Rubber Co. and the Stokes Asbestos Co., to manufacture brake linings for automobiles and industrial machinery.

DeSoto Gets More Space

DETROIT, March 18—All of the passenger car manufacturing facilities of the Chrysler Motors plant in Highland Park are now being devoted exclusively to the manufacture of De Soto cars.

Spring Parts Firms Merger Completed

CHICAGO, March 21—Stockholders of the Nachman-Springfilled Corp., of this city, yesterday approved the merger of the Spring Co., recently formed to acquire all the capital stock of the Kay Mfg. Co., of Brooklyn, with the Nachman company. The merger will be effected through the issuance of 34,000 shares of Nachman capital stock in exchange for 100,000 shares of stock in the Spring Co.

With this merger the Spring Co. will disappear, leaving the Nachman-Springfilled Corp. owner of all stock in the Kay Mfg. Co. The formation of a third organization was necessary to comply with the Illinois laws, which do not permit a corporation of that state to merge with a foreign corporation. The Nachman company owns all of the capital stock of the National-Marshall Spring Corp. Subsidiaries of Nachman were given representation on the board of directors by the election of James L. McInerney and Aaron Lipper, increasing the board to seven members.

Acquires Biflex Stock

DETROIT, March 20—General Spring Bumper Corp. has acquired more than 80 per cent of the common stock of the Biflex Products Corp. of Chicago, in accord with its stated policy to secure 100 per cent of the stock if possible.

Melvin V. Erickson will continue as president of the Biflex corporation.

February Production Totals 497,371 Units

1928	Cars	Trucks	Total
Jan. ...	212,351	27,840	240,191
Feb. ...	301,466	34,834	336,300
Mar. ...	387,048	43,735	430,783
Apr. ...	385,394	48,921	434,315
May ...	405,627	54,098	459,725
June ...	381,963	43,232	425,195
July ...	358,914	58,398	417,312
Aug. ...	424,867	67,676	492,543
Sept. ...	375,444	61,042	436,486
Oct. ...	352,992	62,640	415,632
Nov. ...	225,408	43,294	268,702
Dec. ...	212,527	30,682	243,209
Total	4,024,001	576,531	4,600,532
Jan. '29	366,275	55,941	422,216
Feb. '29	436,075	61,296	497,371
Total	803,856	117,170	921,026

Houdaille-Hershey Corp. Declares First Dividend

DETROIT, March 19—The Houdaille-Hershey Corporation at the first full directors' meeting since the consolidation declared an initial quarterly dividend of 62½ cents a share on the class A stock and an initial quarterly dividend of 37½ cents a share on the class B stock of the corporation. Both dividends are payable April 1 to stock of record March 25.

These dividends are at the annual rate of \$2.50 a share on the class A stock and \$1.50 a share on the class B stock, which is the same annual rate established on shares of the former Houdaille corporation and Hershey corporation. The former Oakes Product Corp. dividend was at the annual rate of \$2.50 a share on the class A stock and \$1.20 a share on the class B stock.

Reeves Guest of A.A.A.

WASHINGTON, March 21—The fifth annual conference of secretaries and managers of motor clubs affiliated with the American Automobile Association opened here yesterday with more than 500 in attendance. A. F. Reeves, general manager of the National Automobile Chamber of Commerce, was among the guests of honor at a luncheon which followed the opening session.

Roscoe B. Jackson Dies on Vacation

President of Hudson Motor
Car Co. Had Long Auto-
mobile Career

DETROIT, March 21—Roscoe B. Jackson, president and general manager of the Hudson Motor Car Co., died suddenly the night of March 19, in Mentone, southern France, following a two days' illness from influenza. He was one of the organizers of the Hudson Motor Car Co., of which he became president Jan. 20, 1923.

Mr. Jackson, who was 50 years old, was born at Ionia, Mich., the son of Mr. and Mrs. Andrew Jackson. He attended the University of Michigan, where Roy D. Chapin and Howard E. Coffin, later his business associates, became his closest friends. Following his graduation he went to Lansing and joined the engineering department of the Olds Motor Works, remaining there until 1907, when he became factory manager of the E. R. Thomas Motor Co., of Buffalo.

In Detroit, in 1909, Messrs. Jackson, Coffin, Chapin, and the late J. L. Hudson organized the Hudson Motor Car Co., Feb. 24. Mr. Jackson became general manager of the company on his taking the presidency, and was later elected treasurer also.

Until a few months ago Mr. Jackson always avoided interviews and had uttered few public statements, and it had been said often that he was one of the mystery men of the automotive industry. His contacts with the executives of the Hudson company were restricted largely to business matters. For years he had no office in the main administration building, but kept an office of his own out in the factory close to production activities.

Credit has been given him for most of the administrative ability and far-sightedness which started Hudson to becoming one of the largest independent producers among the automobile companies.

Mr. Jackson left Detroit a month ago for the winter season on the French Riviera, accompanied by Mrs. Jackson, who was Louise Webber, a niece of J. I. Hudson. The Jacksons were married in 1907. Besides the widow, surviving members of Mr. Jackson's family are a brother, Sidney P. Jackson, of Detroit; a son, Richard W. Jackson; a daughter, Mrs. Eleanor Bingham, and two sisters.

Cirrus Plant to Open

CHICAGO, March 23—Production of the American Cirrus engine will begin Monday in a new plant at Belleville, N. J., it became known here today. Only minor changes of British specifications will be made in the American product. Capacity of the plant will be normally 15 engines per day, and pro-

duction of 10 engines per day is expected by July 1.

The British Cirrus engine is built by Cirrus Aero Engine, Ltd., of England, the latest product being known as the Cirrus Mark 111. The engine is a four-cylinder in line air-cooled vertical, with a normal output of 88 hp. at 1900 r.p.m., and a maximum hp. of 95 at 2100 r.p.m.

W. L. Velie, Jr., Dies After Sale of Mono

MOLINE, ILL., March 20—W. L. Velie, Jr., died shortly before noon here today when he was stricken with heart disease. Only two days ago negotiations for the sale of the Mono Aircraft Corp. were approved by stockholders, and Mr. Velie had planned to depart today for the South to recover his health. He had been ill two days.

Since the death of his father, four months ago, Mr. Velie had suspended production of the Velie car. Mono Aircraft Corp. continued to operate as a subsidiary of the Velie Motors Corp. With the sale of this company to Allied Aviation Industries, Inc., St. Louis holding company formed by Love, Bryant & Co. and Augustine & Co., brokers, Mono stockholders will receive \$9.40 a share for their common stock and \$50 a share with accrued dividends for the preferred. It was understood that Mr. Velie was to continue with the Allied company in an executive capacity and that production was to continue at the Velie Motors plant for the rest of the year.

Allied Aviation Industries, Inc., is capitalized at 500,000 shares of no par value stock of which 300,000 will be issued. It has already acquired the properties of several aviation and engine companies.

Denies Stromberg Report

CHICAGO, March 20—W. L. O'Neill, president of the Stromberg Motor Devices Co. of Chicago, announced here today that "there was no prospect of the company ever moving to South Bend, and that business operations of the company would be continued here indefinitely." He made the assertion to contradict a statement credited to Vincent Bendix and published last week in *Automotive Industries* to the effect that the Stromberg Motor Devices Co. would be moved to South Bend, Ind., where the principal Bendix shops are located. Mr. Bendix and the Curtiss and Wright aeronautical interests recently acquired control of the Stromberg Carburetor Co. of America.

Brake Data Book Out Soon

NEW YORK, March 19—The Asbestos Brake Lining Association announces that the new 1929 data book covering sizes of brake linings and clutch facings will be ready for distribution during the month of April.

Business in Brief

Written by the Guaranty Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES.

NEW YORK, March 21—The abnormally warm weather and the heavy rains last week, coming after a brief period of severely low temperatures, caused floods in the West, South, and Central sections of the country to the detriment of trade. Generally, all outdoor work suffered in these sections. Industry in general, however, continued on an active scale.

ELECTRICITY CONSUMPTION

Industrial activity in February, based on the consumption of electricity by manufacturing plants throughout the country, was six per cent above that in January and 10 per cent above that in February, 1928. The February rate of consumption of electrical energy by manufacturing plants was 0.3 per cent above the high record reached in September, 1928.

FREIGHT CAR LOADINGS

Car loadings for the week ended March 2 totaled 976,987 cars, which marks an increase of 69,650 cars over those in the week before and a gain of 17,493 cars over those in the corresponding week last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended March 16 stood at 98.2, which compares with 98.2 the week before and 98.4 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended March 13 were 14 per cent above those in the corresponding week last year.

STOCK MARKET REPORTS

The stock market last week recovered from the weakness of the few preceding weeks, gaining strength as the week advanced. The comparative easing of call money rates, which ranged from six per cent to nine per cent, had much to do with the renewed strength. Brokers' loans in New York City decreased \$20,000,000 during the week ended March 13, and on that date stood at \$5,627,000,000, which is approximately 50 per cent above those of a year ago.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended March 13 showed decreases of \$33,500,000 in holdings of discounted bills and of \$21,500,000 in holdings of bills bought in the open market. There were increases of \$2,300,000 in holdings of Government securities and of \$12,100,000 in member bank reserve deposits. The Reserve ratio on March 13 was 70.7 per cent, which compares with 69.7 per cent a week earlier.

Tire Plant Growth Under Way in South

Investments in Georgia and Alabama Reach Total of Several Millions

ATLANTA, March 19—With construction projects now under way in Georgia and Alabama entailing an investment amounting to several million dollars, the automobile tire and fabric industries of the South are experiencing this year their greatest period of expansion.

The Goodyear Tire & Rubber Co. is making rapid progress with the first unit of its new plant at Gadsden, Ala., which will be ready to begin operating the first of July. The company's Clearwater Mills at Cedartown, Ga., will furnish the fabric to be used at the Gadsden plant.

The B. F. Goodrich Co. will erect a plant at Atlanta, at a cost of approximately \$4,000,000. This, in connection with the company's program for enlarging its Thomaston mill to include 80,000 spindles for the production of tire fabric, bring the company's southern investment to \$7,500,000 and will make Goodrich the largest tire producers in the South.

Firestone Tire and Rubber Co. is silent regarding its southern plans, although it is known that Harvey S. Firestone, Sr., has declared he is considering the advisability of locating a plant in the South.

Predicts Unchanged Prices

AKRON, March 19—"So far as Goodrich is concerned, I can see no justification for a change in tire prices and present prices, in my opinion, will be continued for some time," said James D. Tew, president of B. F. Goodrich Co., in reply to reports on tire price changes. Mr. Tew's statement is considered representative of the industry in Akron.

New Fargo Packet Truck Has Six-Cylinder Engine

DETROIT, March 18—Announcement has been made by the Fargo Motor Corp., division of Chrysler Motors, that the Fargo Packet ½-ton delivery truck is to be powered by a six-cylinder engine. All Fargo trucks are now of the six-cylinder type. With the adoption of the new cars, prices have been increased slightly, the chassis price being advanced from \$545 to \$595. Prices of the various body models are: \$835 for the canopy, \$845 for the panel and screen deliveries and \$945 for the sedan.

The new packet engine develops 55 hp. at 3000 r.p.m. and has a bore and stroke of 3½ by 4 in., giving it a piston displacement of 174.9 cu. in. The crankshaft is of the four-bearing type, 2¼ in. in diameter. Naturally the performance of the vehicle is improved by the new engine. Keeping the price

down below \$600 for the chassis was made possible by developing the powerplant from the De Soto Six engine, thereby obtaining the advantage of a much larger production.

Canadian Exports Gain in January

WASHINGTON, March 21—Exports of motor vehicles from Canada during the month of January rose to \$3,816,722, exceeding December exports by \$849,194, or a gain of 28 per cent, according to a statement issued this week by the Department of Commerce.

Shipments of passenger cars and trucks increased 36 and 56 per cent, respectively, over the previous month. The greatest gain of passenger car exports was shown for the medium-priced class—\$500 to \$1,000—which registered a gain of 71 per cent. Total exports were far in advance of those for February of last year. Passenger car units increased 206 per cent and trucks 100 per cent.

Trucks of a capacity of over 1 ton exported during January numbered 1615 while during the same month last year no trucks of this class were shipped, the reports states. The average value of passenger cars and trucks shipped during last January was \$439 and \$401, respectively, as compared with \$460 and \$417 in December.

Bohn Aluminum & Brass Shows 170 Per Cent Gain

DETROIT, March 18—Bohn Aluminum & Brass Corp. reports net earnings of \$3,180,423 for 1928, a gain of 170 per cent over the previous year when net earnings totaled \$1,181,606. Sales of the corporation totaled \$31,797,029 compared with \$12,465,916 in 1927, a gain of 154 per cent. Earnings for the past year were equivalent to \$9.09 a share on the outstanding 350,000 shares of capital stock, against \$3.38 a share earned on 349,361 shares in 1927.

Total assets practically doubled during the year, increasing to \$11,303,886 on Dec. 31, last, from \$5,865,649 at the close of 1927. Cash increased to \$1,980,559 from \$467,754, an increase of 323 per cent, despite the retirement in December of the entire \$800,000 Michigan Smelting bonds. Working capital almost trebled, totaling \$4,604,408, against \$1,613,402 a year previous.

Plant to Employ 700 Men

MOLINE, ILL., March 18—New factory unit of the Farmall Tractor plant of the International Harvester Co. here, to be completed within the next 10 days, will make possible the addition of 700 more men to the factory force, according to E. H. Sohner, superintendent.

Brubaker Expanding Plant

MILLERSBURG, PA., March 18—W. L. Brubaker Bros. Co., maker of taps and dies, is constructing an addition to its plant here, 100 by 76 ft.

Automotive Demand Continues at Mills

Steel Producers Considering if High Peak Has Been Reached

NEW YORK, March 21—Volume of steel required by automotive consumers continues at so high a level that the question uppermost in the minds of producers is whether the crest of the movement has been reached. Because of overlapping of old contracts in most products the tonnage involved in specifications, rather than new buying, must be taken as market criterion. Relatively little is heard about second quarter contracting, although in some products, including hot-rolled strip, there is considerable activity along that line.

Where new contracts entail an advance of price, such as is called for by the new list of extras on narrow sizes of cold-rolled strip, consumers show some hesitancy in closing for more than their April requirements. It is said that some users of narrow cold-rolled strip intend to buy wider strips, and to do their own shearing. The new list of extras is based on an exhaustive study of costs, and producers, eager to increase their sales of wide strip, are said to favor this.

Rollers of finished automobile sheets are pressed for deliveries, and with the market for sheet bars tight at the \$1 advance to \$35, some of the non-integrated rollers experience considerable difficulty in keeping supplied with sufficient semi-finished material. Automotive alloy steel producers have to contend with higher prices for ferro-alloys. Makers of cold-finished steel bars experience little difficulty in booking new business at the advance forced upon them by the rise in the price of hot-rolled bars. Demand for bolts and nuts from automotive users continues good.

Pig Iron—While the Valley market has so far not been fully established on the 50 cents per ton higher basis which most furnaces are trying to obtain, the market in the Middle West rules strong with \$20 the Chicago base price. The Michigan price is at the same level.

Aluminum—Automotive demand continues good. High levels in the copper market furnish an element of uncertainty as to how long prevailing aluminum prices will continue in effect.

Copper—Conditions in the copper market teem with excitement. One hears talk on the one hand of 25 cents copper making its debut before long and on the other of some of the producers being more than anxious to see the market stabilized at around the 22 cent price. The market's frenzy is ascribed in many quarters to speculation, the statistical position of the metal offering no explanation for the recent sharp advances with automotive consumption of the red metal at the rate of 125,000 net tons a year, the advance in the copper market since Jan. 2 has added between \$14,000,000 and \$15,000,000 to the automotive industry's annual raw material bill.

Tin—The market is firm and higher.

Zinc—Firm and fairly active.

Thirty-Two Firms Form Huge Merger

Industrial and Farm Equipment Makers Unite in Cooperative Organization

CHICAGO, March 19—Organization of 32 independent manufacturers and distributors of tractors, farm implements and industrial equipment in a cooperative manufacturing, marketing and financing movement, with combined assets of more than \$125,000,000, was announced here today by Milton W. Anderson, president and general manager of the company which will be known as the United Tractor & Equipment Corp.

Through several hundred dealers the 15 manufacturers and 17 distributor members will market a full line of farm and industrial tractor equipment designed for operation with their product, the United tractor, which is now being produced by the Allis-Chalmers Mfg. Co. of Milwaukee, a member of the corporation.

"We united some of the greatest forces of commerce, manufacture and distribution to build and market a full line of equipment and our tractor at the lowest cost consistent with high quality," Mr. Anderson announced today in his office at 612 North Michigan Ave.

"For the first time our engineering authorities have had the experience and advice of distributors with practical knowledge of their requirements. The Agricultural Bond & Credit Corp., the only financing house dealing exclusively in tractor and equipment paper, is one of our members, making us of real help to dealer and users. The dealer can make all time sales with no cost and no liability.

"The officers of the corporation are: Milton W. Anderson, president and general manager; W. B. May, of W. B. May, vice-president; E. R. Wehr, the Wehr Co., secretary-treasurer; Walter Stienke, the Trackson Co., assistant secretary-treasurer. Directors include President Anderson, Walter Stienke, E. R. Wehr, W. B. May and H. C. Merritt, Allis-Chalmers Mfg. Co.; Arthur S. Hughes, Hughes-Keenan Co.; Robert Lea, Moline Implement Co.; A. W. Logan, Motor Power Equipment Co.; B. C. Thompson, Thompson Auto & Machinery Co."

The following are the manufacturing members: Allis-Chalmers Mfg. Co., tractors; The Wehr Co., The Trackson Co., all of Milwaukee; Brookville Locomotive Co., Brookville, Pa.; Dorsey Brothers, Elba, Ala.; Hughes-Keenan Co., and the Roderick Lean Mfg. Co., Mansfield, Ohio; Turner Mfg. Co., Statesville, N. C.; The Perry Co., Sidney, Ohio; Muskogee Iron Works, Muskogee, Okla.; Brenneis Mfg. Co., Los Angeles; Ferguson Mfg. Co., Evansville, Ind.; Universal Power Shovel Co., Detroit; Athens Plow Co., Athens, Tenn.; Moline Implement Co., Moline, Ill.

Distributors in the corporation are the

Howard Cooper Corp., Portland, Ore.; O. R. Peterson Co., Inc., San Francisco; B. Hayman Co., Inc., Los Angeles; Ferris Tractor Co., Dallas, Texas; Thompson Automobile & Machinery Co., New Orleans; Dealer's Equipment and Implement Co., Memphis; Truck Tractor Equipment Co., Columbus, Ohio; Motor Power Equipment Co., St. Paul, Minn.; W. B. May, Inc., Buffalo, N. Y.; Cunningham-Ortmeyer Co., Milwaukee; C. V. Ruble, Kansas City, Mo.; C. H. Turner Mfg. Co., Statesville, N. C.; John M. Brant, Bushnell, Ill.; Dealers Equipment Co., Oklahoma City; C. W. Bull Equipment Co., Houston, Texas; British Columbia Tractor Equipment, Ltd., Vancouver, B. C.; George A. Clark, Toronto, Ont.

Sir Percival Explains Ford's Progress Abroad

LONDON, March 16—Sir Percival Perry, chairman of the Ford Motor Co., Ltd., at a meeting of the shareholders recently, said the associated companies had delivered more than 50,000 Model A cars in the first three months of the new organization. He explained that the improved Fordson tractor should be in production at the Cork plant within a short time and that good progress was being made in the recapitalization and reorganization of the European companies.

In addition to public offerings of shares in France, Holland, Belgium and Germany, he said, shares were to be offered in Italy, Spain and the Scandinavian countries, allotment of shares to be confined as far as possible to the people of each country. Sir Percival said it was intended to increase the output of the Berlin plant, which already was turning out cars and tractors at the rate of 20,000 annually.

Ford January Output 159,786

DETROIT, March 18—World production of the Ford Model A was 159,786 cars for January, the Ford Motor Co. reveals, of which 132,078 were made in domestic plants, 16,765 in foreign plants, and 10,143 by the Ford Motor Co. of Canada. During 1928 Ford delivered 51 airplanes, approximately three times the number built and sold in 1927.

Chevrolet Production Reaching New Quota

DETROIT, March 20—The manufacturing facilities of Chevrolet Motor Co., numbering 16 manufacturing plants in this country, are rapidly approaching the volume of output necessary to meet this year's revised annual quota, which calls for the manufacture of 1,350,000 passenger car and truck units.

W. S. Knudsen, president of the company, announced last week that March production would reach 140,000 units, an amazing output when it is considered that active production on the new six-cylinder cars has been under way less than three months. Although no definite figures were issued it can readily be assumed that April's schedule will call for an even larger production.

Ruthenberg Leaves G.M. Truck Post

Accepts Office of President and General Manager of Copeland Products

DETROIT, March 20—Louis Ruthenberg has resigned as vice-president and assistant general manager of the General Motors Truck Co. to become president and general manager of Copeland Products, Inc., of Detroit, manufacturer of refrigeration machines.

Mr. Ruthenberg has been associated with General Motor Corp. since 1912, when he became assistant chief engineer for the Dayton Engineering Laboratories. He was made general superintendent in 1916 and in 1922 assumed the duties of manager of the manufacturing division of General Motors Research Laboratories.

Next he was named general manager of the Yellow Sleeve Valve Engine Works, Inc., at Moline, Ill., a subsidiary of the Yellow Cab Mfg. Co., which position he held until the merger with General Motors Truck Co. In 1927 he went to Pontiac to supervise the erection of the new plant of the General Motors Truck Co.

Mr. Ruthenberg was born in Louisville. He studied mechanical engineering at Purdue University, and his early experience was gained with various American and European companies engaged in motor vehicle development. He is a stockholder and director of the Day-Fan Motor Co. of Dayton.

Forty associates of Mr. Ruthenberg, both at Pontiac and at Moline, Ill., tendered him a dinner in Detroit, March 17.

Bendix Earns \$2,200,000; Three Directors Elected

SOUTH BEND, March 19—Net earnings of the Bendix Corp. for the year ending Dec. 31, 1928, exclusive of the Eclipse Machine Co., controlled by Bendix, were approximately \$2,200,000 after all charges, Vincent Bendix, president of the corporation, told the stockholders at the annual meeting held yesterday. John C. Ferguson and W. L. McGrath, president and vice-president of the Eclipse Machine Co., and E. H. Cassels, attorney, were elected directors of the Bendix Corp., increasing the directorate to ten from seven. Other directors were reelected.

Gardner Adds Two Sedans

ST. LOUIS, March 20—Gardner Motor Co. announces a new seven-passenger sedan to its Series "130," eight-in-line. This car, mounted on a 143-in. wheelbase and equipped with a 125-hp. engine, is priced at \$2,695, f.o.b. A seven-passenger sedan also has been added to the "125" series, having a 138-in. wheelbase and priced at \$2,195, f.o.b.

Men of the Industry and What They Are Doing

Mayo Co. Elects Directors; Reorganization Underway

Stockholders of the Mayo Co., which recently moved its factory from Dayton to Portsmouth, Ohio, after acquiring the Heer Engine Co., have elected the following board of directors in carrying out the reorganization of the company: Mark W. Selby, Homer C. Selby, Roger A. Selby, Fred Rihlman, Earl T. Pursell and Charles Scudder, all of Portsmouth, and John C. C. Mayo, of Ashland, Ky.

The company will issue \$250,000 in stock, following the reincorporation of the company under Ohio laws. E. G. Livesay, general manager, announced that extensive repairs will be made to the acquired plant of the Heer Engine Co. The company produces a line of jacks, cranes, gear pullers and other shop equipment.

Hastings and Haven Named

Franklin Automobile Co. has appointed Kent C. Haven to the engineering staff of R. W. Hastings, according to E. S. Marks, chief engineer. Mr. Haven has been with the Franklin company for more than 10 years. Mr. Hastings, formerly with the Locomobile Co. of America, has been given direct supervision of Franklin springs, shock absorbers, wheels, tires, wheel brakes, front axles and rims.

Foote Gear Appoints Miller

W. J. Miller, formerly president of the Northwestern Steel and Iron Co., Minneapolis, was appointed vice-president of the Foote Bros. Gear and Machine Co., and will be in charge of the manufacturing and sales of the new road machinery division.

Rupprecht Leaves New Standard

Charles F. Rupprecht, of Hasbrouck Heights, N. J., announces that he has severed his connection as factory manager of the New Standard Aircraft Corp. to organize a professional service for aircraft manufacturers, covering plant design and construction.

Dawson Elected President

Joe Dawson, former race driver and now service manager of the Marmon Philadelphia Co., was elected by unanimous ballot this week to serve as president of the Philadelphia Service Association for the coming year.

Rouze Succeeds Scott

C. F. Rouze, formerly branch sales manager, General Motor Truck Co., Kansas City, has been appointed branch manager, succeeding Estel Scott who resigned recently.



Fred W. Gardner

Vice-president, Gardner Motor Co., Inc., who is making an extended trip through Europe, studying the trend in automobile construction. He plans to return early in April.

James Leaves for Colombia

Edwin W. James, chief of the division of design, U. S. Bureau of Public Roads, sailed from New York this week for Colombia where he will serve as a member of a commission to study and prepare plans for the improvement of the entire system of transportation and communication in that country.

Edison Heads Splitdorf

Charles Edison, son of Thomas A. Edison, has been made president of the Splitdorf Electrical Co., and the Splitdorf-Bethlehem Electrical Co., both of which have come under the management of Edison Industries, Inc.

Mooch on Committee

Harry G. Mooch, vice-president of H. M. Ballard, Inc., has been appointed a member of the special committee to conduct an investigation for the National Wholesalers Conference, William Butterworth, president of the Chamber of Commerce of America, announces.

Baker-Raulang Names Sankey

The Baker-Raulang Co. of Cleveland, has appointed Russell H. Sankey sales manager in charge of body sales work. Mr. Sankey for six years was sales manager of the Philips Custom Body Co., of Warren, Ohio.

Huebotter Joins Waukesha

H. A. Huebotter, formerly chief engineer of the Butler Mfg. Co., Indianapolis, has joined the technical staff of the Waukesha Motor Co., Waukesha, Wis.

Johns-Manville Elects

L. H. Brown as President

At a meeting of the board of directors of the Johns-Manville Corp., William R. Seigle was elected chairman of the board, succeeding H. E. Manville, who resigned to become chairman of the executive committee. Lewis H. Brown was elected president in place of Theodore F. Merseles, who died recently. Other officers elected were S. A. Williams, vice-president in charge of factories and mines, and E. M. Voorhees, secretary.

Mr. Seigle joined the Johns-Manville Corp., in 1900, and previous to yesterday's election was vice-president in charge of factories and mines. The new president, Mr. Brown, previously had been assistant to the president and secretary. Previous to his connection with the company he held a number of positions with Montgomery Ward & Co.

Celeron Organization Unchanged by Combine

BRIDGEPORT, Pa., March 18—Few internal changes will be made in the organization of the Celeron Co., manufacturer of timing gears, by the merger of the Diamond State Fibre Co. and the Continental Fibre Co. as the Continental-Diamond Fibre Co., officials announce. The Celeron Co. was a division of Diamond State Fibre.

J. H. Taylor will remain as president of the Celeron Co., T. E. Webster as vice-president, T. J. McFadden will be in charge of the Detroit sales office, and W. L. Millener will handle the Chicago territory, according to a statement by Mr. Webster.

Sales of the Celeron Co. for 1928 were reported as \$8,709,777, compared with \$6,568,861 for 1927. Net profits for 1928 reached \$1,332,049, as against \$524,780 for 1927. Sales in January and February of this year are reported to be 275 per cent ahead of the corresponding period of last year.

Motor Wheel Elects

DETROIT, March 19—Harry F. Harper has been reelected president and general manager of the Motor Wheel Corp. Other officers elected are: W. C. Brook, vice-president; D. L. Porter, vice-president and treasurer; J. B. Sigfried, vice-president, and Clarence C. Carlton, secretary. Ray Potter, banker and manufacturer, has been elected to the board of directors, taking the place of the late B. S. Gier.

Sloan Announces Purchase of Opel

G.M. Prepares for Expansion Abroad After \$30,000,000 Transaction

NEW YORK, March 18—General Motors Corp. has formed an association with the Adam Opel Co. in Russelheim, Germany, through the taking over of a substantial interest in that company at a cost of approximately \$30,000,000, according to a statement issued by Alfred P. Sloan, Jr., president of General Motors, at Wiesbaden, Germany, today.

This event marks the transition of General Motors into an international manufacturing as well as distributing organization. According to Mr. Sloan's announcement it gives General Motors an opportunity to rapidly expand its business and strengthen its position generally by adding to its present line a car of European design particularly adapted to markets like Germany where conditions and necessities differ from those in this country, for which the bulk of General Motors products were designed.

The Opel company, which manufactures about 45 per cent of the total number of cars produced in Germany, will continue to be operated as an independent organization by the present management. General Motors cooperation will consist of engineering, manufacturing, financial and managerial contributions which it is hoped will result in enhancement and expansion of Opel's already high efficiency.

The Opel plants rank favorably in size with General Motors plants in this country, and employ approximately 12,000. An extensive dealer organization is maintained throughout Germany and surrounding countries.

The German company makes six chassis, beginning with a small car of one liter (62 cu. in.) piston displacement. Two chassis have four-cylinder engines, three have six-cylinder and one is an eight. The small four-cylinder model, having the biggest production, has a wheelbase of 99 in. and a tread of 46 in., while the eight-cylinder has a wheelbase of 145 in. and a tread of 59 in.

Citroen Rumor Denied Abroad

PARIS, March 19—Officials of the Citroen Co., of this city, today emphatically denied rumors to the effect that the General Motors Corp. had obtained controlling interest in its stock.

Melling Buys Reliance

DETROIT, March 19—The business and equipment of the Reliance Engineering Co., of Lansing, has been purchased by the Melling Forging Co. It is understood that Reliance stock will be traded in on a two to one basis, Melling exchanging one share for two of Reliance.

Financial Notes

Foot-Burt Co., Cleveland, manufacturer of drilling machines, will reduce its capital structure to common stock through retirement of all funded debt and one remaining senior issue, because of the popularity of common stock. The company has called for redemption April 1 all outstanding Class A \$3.50 cumulative dividend stock at \$55 a share. First mortgage bonds also will be retired.

Square D Co. of Detroit and Industrial Controller Co. of Milwaukee reports consolidated net earnings as \$428,097 in 1928, compared with \$425,047 in 1927. Last year's earnings were equal to \$4.70 a share on the class A stock and \$5.01 on the class B against \$4.67 on the A and \$4.97 on the B in 1927.

Pierce-Arrow Motor Car Co. and Pierce-Arrow Sales Corp. report net loss for 1928 of \$1,293,025 as compared with a net loss for 1927 of \$783,200. Total assets of the company at the end of the year were \$15,383,567 as compared with \$24,373,081 at the end of 1927 for the old company.

Continental Motors Corp. has called for redemption on April 15, 1929, the outstanding first mortgage sinking fund 6½ per cent gold bonds. These bonds will be paid for at par with accrued interest plus 2½ per cent premium on the principal amount.

Doehler Die Castings Co. has declared regular quarterly dividend of 87½ cents on 7 per cent preferred stock and \$1.75 on \$7 preferred, both payable April 1 to holders of record March 21.

Marlin-Rockwell Corp. has declared regular quarterly dividend of 50 cents and an extra dividend of 50 cents, both payable April 1 to holders of record March 22.

Southern Air Transport, Inc., has offered 100,000 shares of no par value capital stock at \$14 a share.

Briggs Mfg. Co. reports net profit after all charges for 1928 as \$4,313,282. This is equivalent to \$2.15 a share on capital stock and compares with earnings of \$1,155,729 or 57 cents a share, in 1927.

American Bosch Magneto Corp. reports net profit for 1928 after all charges of \$1,040,255. This is equivalent to \$5.01 a share on stock and compares with \$469,174, or \$2.29 a share in 1927. Sales for 1928 totaled \$13,446,178 as against \$7,975,027 for 1927.

Western Air Express Corp. is offering a block of capital stock of \$20 par value for public subscription. The company is capitalized by 170,075 shares.

Peerless Motor Car Corp. reports net loss for 1928 of \$1,243,724. This compares with net loss of \$725,733 in 1927.

General Spring Bumper Corp. has declared an initial dividend of 37 cents a share on the Class A stock for the fractional quarter dating from Feb. 6, 1929, the date of incorporation, to April 1, 1929, which is at the rate of \$2.50 per year. The directors also declared an initial quarterly dividend of 37½ cents a share on the Class B

stock of the corporation which is at the rate of \$1.50 a share annually on the Class B stock.

John W. Brown Mfg. Co. reports for the year ended Dec. 31 net profit, after making all proper deductions including interest on bonded indebtedness, depreciation and Federal income taxes, amounting to \$577,910.40. These earnings are equivalent to \$5.77 per share on 100,000 common shares outstanding as compared with \$2.51 on the 75,000 shares outstanding during 1927.

The Wolverine Tube Co. reports for the month of February gross sales of \$419,134 comparing with \$305,540 for February last year. Operating profits after interest and depreciation, but before Federal taxes for first two months this year, were \$124,418, which compares with \$53,771 in same 1927 period.

Wilcox-Rich Corp. stockholders at their annual meeting, ratified the proposal to grant Class A stock equal voting rights with the Class B. Heretofore the junior issue has had the sole voting power. Directors and officers were reelected.

Allis-Chalmers Mfg. Co. reports net income applicable to common stock of \$2,933,909 for 1928, against \$2,605,019 for the preceding year. The company's export sale of farm tractors increased 370 per cent. The expansion program for 1929 calls for spending about \$2,500,000.

Sikorsky Aviation Corp. reports net income for the period from Sept. 23, 1928, to Dec. 31, 1928, as \$4,882, equivalent to two cents a share on capital stock. Net sales for the period totaled \$398,185.

Chicago Pneumatic Tool Co. reports net profit after all charges for 1928 as \$1,272,104, or \$13.52 a share, on capital stock. This compares with \$1,210,106, or \$12.82 a share, in 1927.

Briggs & Stratton Corp. stockholders have approved a reclassification of capital under which there will be authorized 750,000 shares of capital stock, without par value, 300,000 to be outstanding. Public offering of part of the new issue will be made.

Midland Steel Products Co. has declared the usual extra dividends of 48 cents on the common and \$1 on the preferred stock, in addition to the regular quarterly of \$1 on the common and \$2 on the preferred, all payable April 1 to stock of record March 22.

Federal Screw Co. has increased dividend from \$1.75 to \$3 per share per annum. Dividend of 75 cents per share will be paid April 1 to stock of record March 20.

Kelsey-Hayes Wheel Corp. reported net profit of \$1,202,220 for 1928 against \$630,877 in 1927.

E. W. Bliss Co. and subsidiaries report profit for 1928 after all charges of \$1,749,736. This compares with \$1,173,935 for 1927.

Jordan Motor Car Co.'s annual meeting scheduled for March 18 was postponed until April 15 for lack of a quorum.

Seven Cars Prepare for May 30 Contest

Indianapolis Classic Will
Draw Big Entry List,
Officials Say

INDIANAPOLIS, IND., March 19—Seven cars already are at the Indianapolis Motor Speedway being groomed for the International 500-mile race which will be held May 30. Tommy Milton, only two-time winner of the Indianapolis race, has a crew preparing, under his guidance, a car for Cliff Durant's stable. Charles Maase, who is owner of the car Lou Moore jockeyed into second place in last May's race, is preparing the car for another ride and is looking for a new pilot for the car. "Cotton" Henning, mechanic, who was Peter De Paolo's chief aid before the 1925 A.A.A. champion retired last year, is working on Dick Dodd's front wheel drive job which is to be driven by Bob McDonough, who is in Florida. Earl Cooper has three cars quartered at the track under the care of Johnny Seymour. Cliff Bergere's speed creation is without an attendant while Clifford spends a few weeks in California.

Advance indications point to an unusually large number of cars being on the track earlier this year than ever before. Throughout the winter there has been an air of tense preparation for the coming 500-mile contest. Racing authorities declare there will be at least forty entries for the coming contest. But only thirty-three cars are permitted to face the starter.

Auburn Reports Sales of 4658

AUBURN, Ind., March 20—The Auburn Automobile Co. today announced that its sales for the quarter ended Feb. 28, 1929, were 4658 cars, an increase of 2852 cars over sales in the corresponding period in 1928.

Hupp Gets Record Order

DETROIT, March 19—The largest order ever received by the Hupp Motor Car Corp., calling for Hupmobile Sixes and Eights to the value of \$2,790,600, has been made by the Chicago distributor, the Gambill Motor Co., Inc., according to a factory announcement.

MacCracken to Remain

WASHINGTON, March 21—The Department of Commerce announced this week that William P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics, has consented to remain at his post two months longer before returning to private business.

Packard Spends to Save

NEW YORK, March 18—Recent price reductions in the Packard Standard Eight were made possible by the expenditure of over \$40,000,000 during the



Before the Fatal Crash of the "Triplex"

Major H. O. D. Segrave (left), holder of the world's automobile speed record; J. M. White, owner of the "Triplex", and Lee Bible, photographed before Bible drove the "Triplex" to his death on March 13. Following the crash, the A.A.A. discontinued the speed trials. Major Segrave, after announcing that he is through with automobile racing for the rest of the year, shipped the "Golden Arrow" to New York, but remained at Daytona Beach himself and won the world's speedboat record from Gar Wood

past six years for plant expansion and improvement of manufacturing facilities, according to Lee J. Eastman, president of the Packard Motor Car Co. of New York, and a vice-president of the Packard Motor Co. at Detroit. The sales of this Standard Eight, Mr. Eastman declared, played a large part in the establishment of Packard sales records last year.

To Erect Plane Factory

CARROLL, IOWA, March 19—Citizens of this community have subscribed \$20,000 to the Saul Aircraft Corp. which will establish a plant here for manufacture of the Triad plane, a three-motored four-passenger cabin model, designed by C. L. Ofenstein, former chief aeronautical engineer of the Department of Commerce. Glenn C. Boyer, formerly of the American Eagle Aircraft Corp., Kansas City, will be resident engineer and factory superintendent.

Budd Gets Order for Duals

NEW YORK, March 18—The Public Service Corp. of New Jersey will equip all future buses with Budd dual wheels. According to a recent announcement, an agreement has been made with the Budd Wheel Co. under which the wheel company will supply all dual wheels required for additional buses.

Essex Challenge Week is Extended to Month

DETROIT, March 18—The Essex Challenge Week, March 4 to 11, sponsored by the Hudson Motor Car Co., has proved so successful that the company has decided to extend the program for a month, using the slogan, "Essex Challenge and Demonstration Month."

In all sections of the country, Hudson-Essex dealers and owners made special tests under newspaper representative supervision. These tests varied all the way from speed demonstrations to demonstrations of endurance such as mountain-climbing and pulling heavy objects such as locomotives. Still other tests were devised to point out fuel economy.

Boeing Adding Plant

SEATTLE, March 18—A general plant expansion program aggregating more than \$200,000, has been undertaken by the Boeing Airplane Co., Seattle, Washington, according to announcement by W. E. Boeing, chairman of the board, and P. G. Johnson, president of the company. The program includes an office building housing the engineering offices, a time office building and a master sewer system for the general plant.

Car Industry Shows Added Employment

Official Report Reveals Increase of 9.4 Per Cent in February

WASHINGTON, March 21—Employment in the automobile industry increased 9.4 per cent in February as compared with January, and pay-roll totals increased 27 per cent, according to a report issued this week by the Bureau of Labor Statistics of the Department of Labor.

Employment increased in nearly all automobile manufacturing centers with most plants operating on overtime schedules, says the report. Airplane manufacturing plants increased their forces and there was increased activity among rubber tire producing plants.

The Bureau's weighted index of employment in the automobile industry for February, 1929, is 132.5 as compared with 121.1 for January, 1929, and 100.6 for February, 1928; the weighted index for pay-roll totals for February, 1929, is 143.3 as compared with 111.4 for January, 1929, and 108.0 for February, 1928. The monthly average for 1926 was 100.

There was a .1 per cent increase in employment and 1.4 per cent in pay-roll totals shown for the automobile tire industry in February as compared with the preceding month. The employment index for this industry is 109.5 for February, 1929; 108.2 for January, 1929; and 99.6 for February, 1928. The pay-roll index figures are 117.8 for February, 1929; 103.4 for January, 1929; and 104.8 for February, 1928.

Wilcox-Rich Sales Up

DETROIT, March 18—Sales of the Wilcox-Rich Corp. for January and February were more than 80 per cent ahead of the same months of last year, according to C. H. L. Flintermann, president of the company, with more than a proportionate increase in net income. While January sales were up 85 per cent, the net for the month gained 164 per cent to \$163,144 against \$62,076 a year ago. The February gain in sales was 81 per cent.

New Biplane Introduced

CHICAGO, March 18—A six-passenger biplane, first of the products of the Great Lakes Aircraft Co. of Cleveland to reach Chicago, was on exhibition at the municipal airport last week. The plane, powered by a Hornet engine, carries the pilot in a cockpit outside and above the cabin.

Wholesale Conference Planned

WASHINGTON, March 21—A meeting of the National Wholesale Conference will be held at the Chamber of Commerce of the United States April 26 and 27, it was announced this week.

Airplanes Solving Farmers' Problems

WASHINGTON, March 21—The airplane is settling the Netherlands farm relief question. Through the use of air transportation, says the Department of Commerce, it is possible to pick strawberries or cut flowers in the westland district of the Netherlands in the morning and deliver them in London in time for their use on the dinner table.

Fairfax Airport Chosen by Airplane Factories

KANSAS CITY, March 19—More than \$1,000,000 is to be spent in factories and field improvements at Fairfax Airport this spring and summer. Woods Brothers Corp., owner of the 1000-acre field, intends to spend \$400,000 in improvements, including an administration building, a new sales and service building and several airplane hangars.

The American Eagle Aircraft Corp. recently moved into its new \$100,000 factory on the field, and is turning out airplanes at the rate of 100 a month. Several smaller manufacturing concerns also are located on the property. R. A. Rearwin, lumberman of Salina, Kan., has purchased two and one-half acres and will spend \$200,000 for a factory to manufacture the Ken-Royce biplane.

Perflex Reports High Sales

MILWAUKEE, March 19—The Perflex Corp., of this city, maker of heavy duty radiators for 19 years, reports that its sales in February exceeded any other month in the history of the company. Present orders exceed those of any other period by 25 per cent and the schedule for March has been advanced to surpass February by 25 per cent, according to Roger Birdsell, vice-president and sales manager.

Curtiss-Reid Will Build

NEW YORK, March 19—Curtiss-Reid Aircraft Co., Ltd., of Montreal, organized some time ago as a subsidiary of Curtiss Aeroplane and Motor Corp., for the manufacture and sale of planes in Canada, has started construction on a manufacturing plant adjacent to its airport in Montreal. This plant will have an annual capacity of between 350 and 400 planes.

G.M. and Pines in Coal Move

DETROIT, March 16—The Amalgamated Coal Corp. capitalized at \$65,000,000, at Johnson City, Tenn., which plans to take over 36 mines operating in Virginia and Kentucky, has among the large concerns interested in the project, General Motors Corp. and the Pines Winterfront Co.

Willys, Optimistic, Returns from Trip

Points to Business Duties When Asked About Diplomatic Post

TOLEDO, March 19—John N. Willys, president of Willys-Overland, Inc., upon his return from a visit of several weeks in California, flatly denied any negotiations pertaining to sale of his interests in the company and announced that he would leave in a few days for a six weeks' trip to visit dealers throughout the country.

Mr. Willys announced that the company shipments for January and February totaled 64,818 cars, which is more than double the shipments of the same months last year. There are now approximately 22,500 workers on the pay-rolls at the plant here and while hours have been shortened in some departments to balance production in the last two weeks, the company has entered a big production program for the rest of March and the entire first half of the year.

There have been rumors abroad that Mr. Willys might be chosen to fill the place of Ambassador Myron T. Herrick in France. When questioned about this the manufacturer replied:

"I am pretty busy in the automobile business which today requires all of the diplomacy anyone would care to have."

Mr. Willys said that the company sales record so far this year was remarkable because of the extreme cold weather in many states where Willys-Knight and Whippet sales are normally high. He reported that business in California was three times what it was a year ago and that the new assembly plant at Los Angeles is turning out 70 cars a day and plans to reach 120 daily production in April. He predicted that the company will have its greatest year in 1929.

Returning with the Willys-Overland president, on a special car were H. J. Leonard, president of the Stearns-Knight Co., Cleveland; David Wilson, head of the Wilson Foundry & Machine Co., Pontiac, and A. B. Qualy, secretary of the Willys-Overland Company.

The company will distribute about \$275,000 of its earnings in the regular quarterly preferred dividend of \$1.75 a share on April 1 to holders of record March 15.

Will Hold Convention

NEW YORK, March 11—The National Battery Manufacturers Association is laying plans for its next convention to be held at the Hotel Gibson, Cincinnati, April 24 to 26, inclusive. Speakers' names have not yet been announced but it is believed that among the speakers will be a member of the Federal Trade Commission and other prominent men. There will also be technical discussions.

Ford of Canada Split-Up Proposed

TORONTO, ONT., March 18—A stock split of twenty shares for one will place the capitalization of the Ford Motor Co. of Canada on an entirely new basis, if plans completed at a directors' meeting, and to be placed before a special meeting of stockholders March 26, are ratified. Stockholders of record March 23 would receive 20 shares of no par value stock, 19 of the shares to be non-voting, for each share of \$100 par value stock now held.

Opportunity to purchase two additional non-voting shares for each share of the old issue will also be given. A portion of the issue will be offered to the public by the company. At present there are 70,000 shares outstanding and 30,000 shares in the company's treasury. Under the new plan there will be a total of 2,000,000 shares, 1,400,000 outstanding and 600,000 in the treasury. Sales of additional shares will be made from the treasury stock. At the close of the first day following announcement of the split-up the outstanding shares had increased in value by \$21,280,000 on the New York Curb.

The appointment of D. B. Greig as secretary and assistant treasurer of Ford of Canada was announced following the directors' meeting.

Martin to Erect Plant

BALTIMORE, March 20—The Glenn L. Martin Co., formerly of Cleveland, manufacturer of airplanes, has purchased almost two square miles of property on Middle River, about 10 miles from Baltimore, and will begin immediately the erection of a large plant for the production of land and sea planes.

Firm Incorporates

SIOUX CITY, IOWA, March 18—Auto-Karyall Mfg. Co., maker of a new automobile trunk luggage carrier, has been incorporated with \$150,000 capital. O. D. Nickle is president; G. A. Danielson, vice-president; A. L. Shidler, secretary, and F. H. Batman, treasurer.

Sugar Cane Waste Used in New Fuel

WASHINGTON, March 21—A new "anti-knock" motor power alcohol, manufactured from sugar cane waste, will soon be marketed by the Shell Company of Australia, according to a dispatch received this week by the Department of Commerce from Sydney. A plant capable of producing from 500,000 to 600,000 gallons of the fuel annually has been constructed at Queensland, it was reported.

Rentschler Elected Head of Aero Exposition Corp.

NEW YORK, March 19—F. B. Rentschler, president of the United Aircraft and Transport Co. and president of the Pratt and Whitney Aircraft Co., Hartford, Conn., has been elected president of the Aeronautical Expositions Corp., a subsidiary of the Aeronautical Chamber of Commerce.

J. C. Hunsaker, vice-president of the Goodyear-Zeppelin Corp., was elected vice-president, S. S. Bradley, vice-president and general manager of the Aeronautical Chamber of Commerce, was elected to the same offices in the Expositions Corp. Luther K. Bell and Owen A. Shannon were elected secretary and treasurer respectively.

An executive committee consisting of Mr. Rentschler, Charles L. Lawrance, president of the Wright Aeronautical Corp., Paterson, N. J.; F. H. Russell, vice-president of the Curtiss Aeroplane & Motor Co., Garden City, L. I.; C. H. Colvin, president, Pioneer Instrument Co., Brooklyn, N. Y., and S. S. Bradley, was appointed.

Ilco Sales Moves Office

DETROIT, March 19—Ilco Sales Corp., handling automotive devices, has moved its office from Connersville, Ind., to this city.

American Entries in Le Mans Race

PARIS, March 16—Among the 20 entries for the Rudge Whitworth Cup 24-hour race when the list closed at reduced fees recently were three Stutz cars, one Oakland and two duPonts. The European makes entered for the contest include: Tracta front-wheel drive, B.N.C., Lagonda, Alvis front-wheel drive, D'Yrsan and a Sara air-cooled model.

Entries at ordinary and double fees will be received for nearly two months longer, during which time it is expected that 20 more cars will be enrolled. Graham-Paige is to put in a team of three. Other American entries considered very probable are Chrysler, Buick and Auburn. Bugatti will enter a team, one of the cars being a dual engine 16-cylinder model.

The race will be held at Le Mans on June 15 and 16. The triangular circuit has been shortened to about 10 miles by building a special cross road which eliminates the hairpin turn at Pontlieue.

G.M. Sales to Dealers Up

NEW YORK, March 18—General Motors dealers sold 138,570 cars to users during February of this year as compared with 132,029 for the corresponding month last year, according to announcement from the office of Alfred P. Sloan, Jr., president. This is an increase of five per cent over last year and compares with 104,488 in January of this year. Sales by General Motors manufacturing divisions to dealers totaled 175,148 as compared with 169,232 in February of a year ago, or an increase of 3½ per cent.

William H. Vogel

MILWAUKEE, March 16—William H. Vogel, president of the Wisconsin Machinery & Mfg. Co., maker of pistons and other automotive parts, died recently. He was 84 years old. During recent years, Mr. Vogel was active as a director of the company in an advisory capacity.

Calendar of Coming Events

SHOWS

Marseilles, Automobiles.....Mar. 17-23
Nantes, Commercial.....Apr. 4-15
Lille, Commercial.....Apr. 6-21
All-American Aircraft Show, Detroit
Board of Commerce, Detroit.....Apr. 6-14
Milan, Trucks.....Apr. 12-27
Jugo-Slavia, Automobiles.....Apr. 20-23
Budapest Auto Salon.....May
Melbourne Automobile Show.....May 2-11
International Aircraft Exhibition, Olympia, London.....July 16-27
International Aircraft Exhibit, Coliseum, Chicago.....Sept. 7-15
Paris, Automobiles.....Oct. 3-13
London, Automobiles.....Oct. 17-26
Prague, Automobiles.....Oct. 23-30
Paris, Motorcycles.....Oct. 23-Nov. 3
M.&E.A. Show, Chicago.....Nov. 4-9
N.S.P.A. Show and Convention, Detroit.....Nov. 11-16

Berlin Auto Salon.....Nov. 14
London, Trucks.....Nov. 7-16
Paris, Trucks.....Nov. 14-24
London, Motorcycles.....Nov. 30-Dec. 7
Brussels Auto Salon.....Dec. 7

CONVENTIONS

Marketing Executives Conference, Hotel Gibson, Cincinnati.....April 3-5
Annual Meeting National Foreign Trade Council, Baltimore.....April 17-19
American Society of Mechanical Engineers, Detroit.....May 1-3
American Management Association, New York.....May 6-11
National Highway Traffic Association, Hotel Stevens, Chicago.....May 13-15
A.S.M.E. Aeronautic Meeting, St. Louis, May 27-30
National Machine Tool Builders' Association, Cleveland.....Sept. 30-Oct. 4

RACES

Akron.....May 12
Gardner Trophy (Aircraft), St. Louis, May 28-30
Indianapolis.....May 30
Detroit.....June 9
Altoona, Pa.....June 15
Rudge Whitworth Cup, Le Mans, June 15-16
Salem, N. H.....June 29
French Grand Prix.....June 30
Akron.....Aug. 18
Syracuse.....Aug. 31
Altoona, Pa.....Sept. 2
Cleveland.....Sept. 15
Salem, N. H.....Oct. 12

S. A. E.

Aeronautic Meeting, Detroit.....April 9-10
Summer Meeting, Saranac Lake.....June 25-28
Aeronautic Meeting, Cleveland.....Aug. 26-28
Production Meeting, Cleveland.....Oct. 2-4